

PATENT COOPERATION TREATY

PCT

From the INTERNATIONAL BUREAU

NOTIFICATION OF THE RECORDING
OF A CHANGE(PCT Rule 92bis.1 and
Administrative Instructions, Section 422)

To:

RUUSKANEN, Juha-Pekka
Page White & Farrer
54 Doughty Street
London WC1N 2LS
ROYAUME-UNI

Date of mailing (day/month/year) 07 June 2001 (07.06.01)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference 102753/JPR	
International application No. PCT/EP00/09105	
International filing date (day/month/year) 14 September 2000 (14.09.00)	

1. The following indications appeared on record concerning:		
<input checked="" type="checkbox"/> the applicant	<input checked="" type="checkbox"/> the inventor	<input type="checkbox"/> the agent
<input type="checkbox"/> the common representative		
Name and Address HOLMA, Harri Itätuulenkuja 1 B 32 FIN-02100 Espoo Finland	State of Nationality FI	State of Residence FI
	Telephone No.	
	Facsimile No.	
	Teleprinter No.	
2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:		
<input type="checkbox"/> the person	<input type="checkbox"/> the name	<input checked="" type="checkbox"/> the address
<input type="checkbox"/> the nationality		
<input type="checkbox"/> the residence		
Name and Address HOLMA, Harri Ripusuontie 92 C FIN-00660 Helsinki Finland	State of Nationality	State of Residence
	Telephone No.	
	Facsimile No.	
	Teleprinter No.	
3. Further observations, if necessary:		
4. A copy of this notification has been sent to:		
<input checked="" type="checkbox"/> the receiving Office	<input type="checkbox"/> the designated Offices concerned	
<input type="checkbox"/> the International Searching Authority	<input checked="" type="checkbox"/> the elected Offices concerned	
<input checked="" type="checkbox"/> the International Preliminary Examining Authority	<input type="checkbox"/> other:	

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer J. Leitaio
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Commissioner
 US Department of Commerce
 United States Patent and Trademark
 Office, PCT
 2011 South Clark Place Room
 CP2/5C24
 Arlington, VA 22202
 ETATS-UNIS D'AMERIQUE
 in its capacity as elected Office

Date of mailing (day/month/year) 07 June 2001 (07.06.01)	Applicant's or agent's file reference 102753/JPR
International application No. PCT/EP00/09105	Priority date (day/month/year) 16 September 1999 (16.09.99)
International filing date (day/month/year) 14 September 2000 (14.09.00)	
Applicant LAAKSO, Janne et al	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:

10 April 2001 (10.04.01)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was
☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

<p>The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland</p> <p>Facsimile No.: (41-22) 740.14.35</p>	<p>Authorized officer J. Leitao</p> <p>Telephone No.: (41-22) 338.83.38</p>
--	--

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF THE RECORDING
OF A CHANGE(PCT Rule 92bis.1 and
Administrative Instructions, Section 422)

From the INTERNATIONAL BUREAU

To:

RUUSKANEN, Juha-Pekka
Page White & Farrer
54 Doughty Street
London WC1N 2LS
ROYAUME-UNI

Date of mailing (day/month/year) 28 January 2002 (28.01.02)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference 102753/JPR	
International application No. PCT/EP00/09105	International filing date (day/month/year) 14 September 2000 (14.09.00)

1. The following indications appeared on record concerning:

☒ the applicant

 ☐ the inventor

 ☐ the agent

 ☐ the common representative

Name and Address

NOKIA NETWORKS OY
Keilalahdentie 4
FIN-02150 Espoo
Finland

State of Nationality

FI

State of Residence

FI

Telephone No.

Facsimile No.

Teleprinter No.

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

☒ the person

 ☐ the name

 ☐ the address

 ☐ the nationality

 ☐ the residence

Name and Address

NOKIA CORPORATION
Keilalahdentie 4
FIN-02150 Espoo
Finland

State of Nationality

FI

State of Residence

FI

Telephone No.

Facsimile No.

Teleprinter No.

3. Further observations, if necessary:

4. A copy of this notification has been sent to:

<input checked="" type="checkbox"/> the receiving Office	<input type="checkbox"/> the designated Offices concerned
<input type="checkbox"/> the International Searching Authority	<input checked="" type="checkbox"/> the elected Offices concerned
<input type="checkbox"/> the International Preliminary Examining Authority	<input type="checkbox"/> other:

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer

Anne KARKACHI

Telephone No.: (41-22) 338.83.38

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
22 March 2001 (22.03.2001)

PCT

(10) International Publication Number
WO 01/20806 A1

(51) International Patent Classification⁷: **H04B 7/005**

(21) International Application Number: **PCT/EP00/09105**

(22) International Filing Date:
14 September 2000 (14.09.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
9921989.1 16 September 1999 (16.09.1999) GB

(71) Applicant (for all designated States except US): **NOKIA NETWORKS OY** [FI/FI]; Keilalahdentie 4, FIN-02150 Espoo (FI).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **LAAKSO, Janne**

[FI/FI]; Paraistentie 17 c 44, FIN-00280 Helsinki (FI).
SAHINOJA, Jari [FI/FI]; Sepelkyyhkyntie 3 B 24,
FIN-02660 Espoo (FI). **HOLMA, Harri** [FI/FI]; Itätuulenkuj
1 B 32, FIN-02100 Espoo (FI).

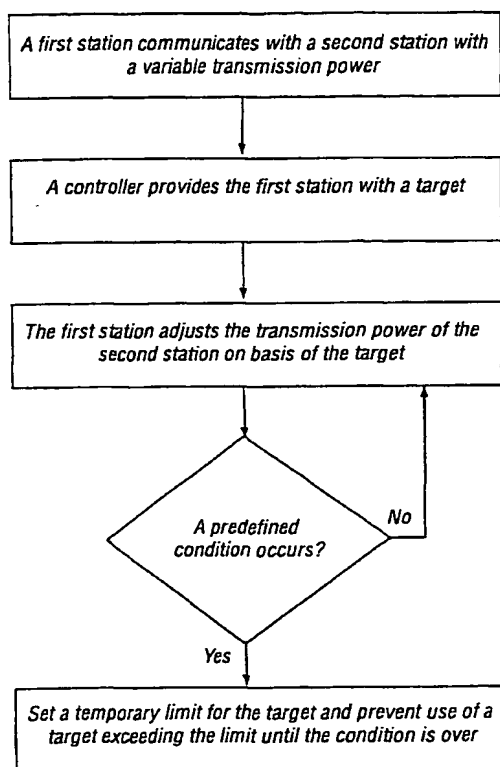
(74) Agents: **RUUSKANEN, Juha-Pekka** et al.; Page White & Farrer, 54 Doughty Street, London WC1N 2LS (GB).

(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE,

[Continued on next page]

(54) Title: **TRANSMISSION POWER CONTROL IN A RADIO COMMUNICATION SYSTEM**



(57) Abstract: The present invention relates to a method in a communication system. The system comprises a controller arranged to control transmission power of stations, a first station and a second station, the controller being arranged to provide the first station with a target for use in control of the transmission power of the second station, monitoring means, and means for preventing use of a target for the transmission parameter that exceeds a limit value. The controller provides the first station with the target and the first station adjusts the transmission power of the second station on basis of the target. A predefined condition is monitored, and upon occurrence of the predefined condition, use of a target for the transmission parameter exceeding a limit value for the target for the transmission parameter is prevented.

WO 01/20806 A1

WO 01/20806 A1



IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Published:

— *With international search report.*

TRANSMISSION POWER CONTROL IN A RADIO COMMUNICATION SYSTEM

Field of the Invention

5 The present invention relates to power control in a communication system, and in particular, but not exclusively, to power control of a station of the communication system in a power limitation situation.

10 Background of the Invention

In a mobile telecommunication system, such as CDMA (Code Division Multiple Access) or WCDMA (Wide-band CDMA) or TDMA (Time division Multiple Access) system, transmission power
15 levels between a base (transceiver) station (BS) and a mobile station (MS) associated with said base station can be continuously adjusted during an ongoing connection between the base station and the mobile station. This is done in order to provide a sufficient quality for the transmission in
20 various conditions. To reduce power consumption and interference it is also preferred to keep the required transmission power levels as low as possible at the same time. By means of this it is possible to avoid "wasting" any network resources and power resources, and to enable as great
25 a number of mobile stations as possible to communicate simultaneously with the base station having only limited power resources. The power resources of the base station are limited both in transmission (downlink) and receiving (uplink) directions.

30

In the uplink the limitation means that a base station cannot receive and process more than a predefined number of connections from mobile stations. The uplink direction can be

limited by increased quality requirements, e.g. in a situation in which a great number of mobile stations is communicating via the base station and request for a higher transmission quality. If the power levels are increased in the cell in order to improve the quality, this increases interference in the uplink. Therefore, in addition to the incapability of the base station to receive more than a limited amount of transmission power from the mobile stations, too high transmission powers from the mobile stations may cause too high interference to the radio traffic within the cell and/or have an adverse influence to the overall performance of the base station.

One power control mechanism is based on power control (PC) commands transmitted between two stations to cause the other station to alter or adjust or change its transmission power. The PC commands can be transmitted e.g. in a WCDMA closed loop functioning between the BS and the MS. The closed loop PC (CLPC) commands can be sent both in the uplink (towards the base station) and in the downlink (towards the mobile station), whereafter the BS or the MS will process the received command and reduce/increase its transmission power towards the receiving station accordingly.

The power control between the stations, such as the closed loop PC, can be controlled by another power control command generated by a controller of the communication system. For example, in the currently proposed WCDMA system it is envisaged that an outer loop power control (OLPC) command generated by a radio network controller (RNC) of the WCDMA system will attempt to set the connection quality target of a physical connection between the BS and MS to be such that a required FER (Frame Error Ratio) target or BER (Bit Error

Ratio) target or any other similar target of the connection is met with a minimal connection quality target. The closed loop power control command is then adjusted at the base station in accordance with the outer loop power control
5 command received from the controller. The connection quality target may sometimes be referred to as a connection setpoint.

The connection quality target or setpoint can be announced e.g. by means of so called Eb/No (Signalling Energy/Noise)
10 target or SIR (Signal to Interference Ratio) target or desired signal level target or a similar parameter indicating a quality measure which can be estimated for the connection. The relationship is such that the connection quality target (e.g. the SIR target) has to be set such that the FER or the
15 BER or similar parameter of the connection remains at an appropriate level. The actual connection quality value (e.g. SIR) is then controlled in accordance with the target value, and one or several of used connection parameters having influence to the quality of the connection should follow any
20 changes in the target value. In most cases it is sufficient if the transmission power is increased/decreased in order to meet the target value. The idea behind the arrangement is that by increasing the connection quality target value the transmission power (or any other appropriate transmission
25 parameter having an influence over the connection quality) will increase and thus the connection quality will increase and the FER will improve.

However, if the appropriate target of the connection quality
30 cannot be met due to e.g. a power limitation situation the connection quality target will start increasing, even though this rise in the connection quality target will not help in causing a better connection between the MS and the BS. The

power limitation condition at the BS can be caused e.g. by an overload situation or a failure. If the power limitation is only temporary the quality target will also be unnecessarily high once this condition has been removed. The temporary

5 power limitation can occur e.g. when too many mobile stations are trying to become connected to one BS, e.g. when a bus or train with several mobile users suddenly enters the radio coverage area of the base station. The power limitation may also occur e.g. when the radio connection between the BS and

10 one or several mobile stations weakens temporarily, for instance, the MS enters temporarily a tunnel or cellar, which will cause a rapid rise in the transmission powers. The failures causing a power limitation situation may occur in the base station, elsewhere in the communication system or in

15 the mobile stations. The power limitation situation may result in an excessively high power levels within the cell until the quality target has returned to its normal (nominal) level. In addition, an uncontrolled power limitation situation (i.e. the powers of the mobile stations may rise

20 freely) will lead to a situation in which the mobile stations positioned in the edge area of the cell start loose the connection i.e. the mobile stations "drop" from the cell. This leads to a decrease in the size of the cell.

25 Earlier proposals to solve the problems caused by the power limitation situation have been based on setting absolute limits on the values of the SIR targets. However, the absolute limits have to be relatively loose due to the variations in the required quality target for satisfactory

30 quality of the communication. There has not been any efficient means for rapidly preventing an excessive increase of the target or setpoint value in an overload or other sudden power limitation situation. Instead, the target value

has increased further as the target is increased accordingly despite the fact that no more power is available or can be received. In addition, when the power limitation situation is over, the recovery from the increased and unnecessarily high target values may take some time.

Summary of the Invention

The embodiments of the present invention aim to address one or several of the above problems.

According to one aspect of the present invention, there is provided a method in a communication system, said system comprising a controller and a first station for communication with a second station with variable transmission power over a radio connection, wherein the controller provides the first station with a target for a transmission parameter of the radio connection and the first station adjusts the transmission power of the second station on basis of the target, comprising: monitoring for a predefined condition; upon occurrence of the predefined condition, preventing use of a target for the transmission parameter exceeding a limit value for the target for the transmission parameter.

According to a more specific embodiment the use of a target for the transmission parameter exceeding the limit value is prevented at the first station. The use of a target for the transmission parameter exceeding the limit value can also be prevented at the controller. The limit value may equal with the target for the transmission parameter in use at the moment of detecting the predefined condition. The predefined condition may comprise a temporary power limitation situation at the first station, an overload situation at the first

station or a failure in the communication system. The monitoring of the occurrence of the predefined condition can be based on determination of the interference power of the radio connection.

5

According to a further embodiment a difference between the value of the target for the transmission parameter provided by the controller and the value of the target for the transmission parameter used for power control by the first station is detected after the predefined condition is over, whereafter the difference between the said two target values is reduced. The difference can be reduced based on history information of the target used for the power control prior the detection of the condition. The difference between the said two target values can be reduced gradually.

15

According to another aspect of the present invention there is provided a communication system, comprising: a controller arranged to control transmission power of stations; a first station and a second station capable of providing a communication path therebetween, wherein the controller is arranged to provide the first station with a target for use in control of the transmission power of the second station; monitoring means for monitoring for a predefined condition; and means for preventing use of a target for the transmission parameter exceeding a limit value for the target for the transmission parameter upon occurrence of the predefined condition.

20

25

The communication system may comprise further detecting means for detecting a difference between the target and the further target and recovery means for reducing the difference after the predefined condition is over.

30

According to a still another aspect of the present invention there is provided a station of a communication system, said station controlling transmission power of a further station transmitting towards the station, wherein the station is arranged to: receive a target for a transmission parameter provided by a controller of the communications system for use in the control of transmission power of the further station; monitor for a predefined condition; and upon occurrence of the predefined condition, to prevent use of targets for the transmission parameter exceeding a limit value for the target for the transmission parameter.

The embodiments of the invention provide several advantages. Should a power limitation situation occur, the embodiments prevent the situation getting even worse by preventing a unnecessary rise of the connection quality target or similar parameter influencing the transmission power in the cell. The powers in the cell may be limited in a level that still can be handled by the base station. The embodiments may also prevent an increase in the interference in the cell. Since the embodiments enable power resource situation within the cell to remain stable, it is possible to prevent disconnection of the ongoing connections, or to limit the disconnecting procedures to the connections having a lowest priority. In addition, the embodiments provide a fast response to a power limitation situation without any excessive delays due to e.g. signalling between a base station and a network controller or several controllers. In addition, the specific embodiments provide a controlled and "smooth" recovery procedure after the power limitation situation has ended.

Brief Description of Drawings

For better understanding of the present invention, reference will now be made by way of example to the accompanying
5 drawings in which:

Figure 1 shows schematically a part of a communication system in which the invention can be implemented;

Figure 2 is a block diagram of the base station and the controller of the communication system of Figure 1;

10 Figure 3 illustrates schematically an embodiment of an outer loop power control mechanism in an overload situation;

Figure 4 illustrates schematically a further embodiment of an outer loop power control mechanism in an overload situation;

15 Figure 5 is a table presenting an example of the operation of the present invention at the transceiver of the communication system;

Figure 6 is a table presenting an example of the operation of the present invention at the controller of the
20 communication system;

Figure 7 is a flowchart illustrating the operation of an embodiment; and

Figure 8 is a flowchart illustrating the operation of a further embodiment.

25

Description of Preferred Embodiments of the Invention

Figure 1 is a block diagram illustrating a context in which the present invention may be used. That is, a WCDMA system
30 (Wideband CDMA) mobile communication system allows a plurality of mobile stations MS1, MS2, MS3 to communicate with a base transceiver station (BS) 4 in a common cell over a radio interface via respective channels CH1, CH2, CH3. The

base station can sometimes be referred to as node B. In the CDMA based systems these channels are distinguished from one another by the use of scrambling codes in a manner which is know per se. Communication between the mobile stations 1-3
5 and the base station 4 may comprise any kind of data such as speech data, video data or other data. The power control commands between the mobile stations and the base station are handled by a closed loop power control mechanism.

10 The base station 4 is controlled by a controller 5 of the communication system. In the CDMA terminology this controller is often referred to as a radio network controller (RNC). The general arrangement is such that while the base station 4 controls the individual mobile stations 1 - 3 in its radio
15 coverage area via the radio channels, the network controller 5 functions as a "central" controller controlling several base stations. The mobile stations 1 - 3 can be controlled by the controller 5 through the base station 4.

20 In the currently proposed WCDMA system the base station 4 receives appropriate control commands from the controller 5 via an outer loop (OL) power control (PC) mechanism. As response to the received commands the base station 4 proceeds accordingly to control the connections with individual mobile
25 stations 1 - 3 via the closed loop (CL) between the respective mobile station and the base station. According to one possibility the commands may be transmitted in the closed loop in the frequency of 1.5 kHz, and in the outer loop in the frequency of about 10 to 100 Hz. However, it is noted
30 that any other frequencies may be used here. The following description of the embodiments will concentrate in more detail on the outer loop power control (OLPC) mechanism between the base transceiver station 4 and the controller 5.

Figure 2 shows in more detail a base station 4 and a radio network controller 5 interacting with each other. The base station 4 of Figure 2 includes a base station control unit (BCU) 6, a transmission power estimation unit (TRX) 7 and a radio channel unit (CHU) 8. The functionalities provided by the respective units as well as the controller 5 are described in the following by using WCDMA terminology. It should, however, be appreciated that the following is only an example of the embodiments and thus the scope of the invention is not restricted by the use of the WCDMA terminology, and that the invention can also be applied to communication systems based on other standards.

The base station 4 of Figure 2 includes a load control (LC) functionality 10 controlling the outer loop power control functionality 12 of the base station (OLPC/BS). The RNC 5 is shown to include a corresponding pair of a load control functionality 11 and an outer loop power control functionality (OLPC/RNC) 13. Communication paths or channels 14 and 15 are provided between the respective LC and OLPC functionalities of the BS 4 and the RNC 5. The RNC is arranged to generate an Eb/No-setpoint 16 which is subsequently transmitted to the BS in a outer loop power control command 15. In the example the command is shown to be in the form of a relative "UP" or "DOWN" command, but the OLPC command from the RNC could also include an absolute value for the targeted Eb/No-setpoint or a relative amount of increase or decrease of the setpoint value.

The OLPC/BS at the BS 4 receives the Eb/No-setpoint and may store the setpoint in an appropriate storage functionality. The Eb/No-setpoint which has been received from the RNC 5 is

shown by a functionality 16 of the BS 4. For the purposes of clarity, the setpoint functionality of the base station 4 is designated correspondingly with the setpoint functionality 16 of the RNC 5.

5

In addition to the Eb/No-setpoint 16, the BS 4 of Figure 2 is shown to comprise a second or further Eb/No-setpoint or a BS Eb/No-setpoint functionality 17. The arrangement is such that the second Eb/No-setpoint functionality 17 is used for
10 controlling the closed loop power control and/or uplink fast load control functionality 18 instead of a direct use of the Eb/No-setpoint 16 received from the RNC. The first Eb/No-setpoint 16 of the BS 4 is always controlled by the RNC 5 and should always have the same setpoint value as the setpoint 16
15 at the RNC 5. The second Eb/No-setpoint 17 is the setpoint actually provided to the closed loop functionality 18. The arrangement is such that in normal operation the second setpoint 17, i.e. OLPC/BS, follows the first setpoint, i.e. OLPC/RNC functionality 16.

20

When the quality of the bearer between the mobile station(s) in the cell and the base station goes bad enough the outer loop PC functionality 13 in the RNC (OLPC/RNC) 5 starts to increase the Eb/No-setpoints 16 of the radio link
25 connection(s). An increase of the Eb/No-setpoints will eventually increase the uplink transmission powers from one or several of the mobile stations in the cell correspondingly. Similarly, a decrease of the Eb/No-setpoints would decrease the transmission powers.

30

According to an embodiment of the invention the Load Control (LC) algorithm 10 at the base transceiver station (BS) 4 may start preventive load control actions in order to avoid a

situation in which mobile stations have to be "dropped" out i.e. disconnected from the cell. For example, the WCDMA Load Control (LC) algorithm 10 may set limit values for the BS outer loop power control parameters or freeze the base station (OLPC/BS) so that the OLPC/BS no longer follows Eb/No-setpoint increase commands by an outer loop power control 16 from the RNC 5 (OLPC/RNC).

The limiting or freezing procedure of the setpoint or target value may be initiated at the BS e.g. when a uplink total interference power level (PrxTotal) at the BS digital receiver exceeds a given threshold value. The total received wideband interference power (PrxTotal) is measured by the base station BS on cell basis for Radio Resource Indication purposes in a per se known manner. This measurement is reported periodically to the controller RNC, e.g. by using known NBAP/RADIO RESOURCE INDICATION procedure. The length of the period can be, for instance, selected from a range between 100ms to 1s. The RNC may then use the measurement results for functionalities such as Admission Control (AC), Load Control (LC), and Packet Scheduler (PS) and so on.

The interference power level can be estimated by the TRX unit 7 of Figure 2. The threshold value for the interference power is designated in the following example by PrxTargetBS. The exemplifying threshold value is defined by equation:

$$\text{PrxTargetBS} = \text{PrxTarget} + \text{PrxOffset},$$

wherein

PrxTarget is the planned target load of the system, and PrxOffset is the allowed marginal above PrxTarget, after which overload prevention actions are to be started.

When the total interference value PrxTotal in Figure 2 exceeds PrxTargetBS the OLPC/BS is frozen, and the BS 4 is no longer allowed to transmit closed loop power control commands (CLPCs) towards the MS 1, even though the BS 4 may
5 still receive OLPCs from the RNC 5. According to a more specific embodiment the outer loop PC functionality 18 in the BS (OLPC/BS) is frozen by the BS load control (BS LC) 10 after the PrxTargetBS is exceeded. In practice this means that the OLPC/BS ignores any Eb/No-setpoint increase commands
10 of the OLPC/RNC until the PrxTotal is below the exceeded threshold.

According to a preferred embodiment present in the flow chart of Figure 7, the connection quality target value is not
15 frozen to any precise value in a power limitation situation, but instead the target used for the connection control is prevented to exceed a certain predefined threshold value. In other words, the power control mechanism is not switched off in a power limitation situation. Instead, the connection
20 quality target can be changed and the transmission power levels adjusted in the cell as long as the target does not exceed the temporary set upper limit.

According to one alternative only "DOWN" or "reduce target"
25 type of commands are allowed in the closed loop while any commands aimed to increase uplink transmission powers in the cell will not become transmitted towards the mobile stations.

Figure 2 presents in more detail the use of the PrxTotal
30 measurement. As mentioned above, OLPC/BS is frozen or a temporary upper limit is set when $\text{PrxTotal} > \text{PrxTargetBS}$. In the BS the OLPC/BS can be frozen or limited on frame-bases, i.e. the determination of the PrxTotal can be accomplished

over each frame. In this case the total wideband interference power received at the BS would be averaged over one radio frame (e.g. 10ms) in the TRX-unit 7 of the BS 4, and reported periodically (e.g. every 10ms) to the BCU unit 8 of the BS 4.

5 PrxTotal can then be calculated on 10ms cycles e.g. by using sliding average window and an ALPHA-TRIMMED-MEAN filter or any other appropriate means for filtering.

The same applies to the OLPC/RNC, but it can be frozen or

10 limited only after a radio resource (RR) indication message 14 is received in the RNC load control 11. The RR indication can be sent e.g. every 0.1s - 1s. The outer loop PC can then be switched on/off based on monitoring of the received PrxTotal.

15

It is to be appreciated that the RNC 5 may alternatively receive some other type indication from the BS 4 instructing the RNC 5 to switch the OLPC/RNC on/off than the PrxTotal indication. It is also noted that the total interference

20 value is only an example of the possible triggering parameter, and other indications of a power limitation situation can also be used for triggering the limitation or freezing procedure of the connection quality setpoint at the base station and/or the controller.

25

As explained, the outer loop PC of the RNC (OLPC/RNC) can be limited or frozen after the overload situation is indicated to the RNC even though this is not always necessary. For instance, the arrangement can be such that the OLPC/RNC does

30 not carry out any Eb/No-setpoint increases, but only replaces "change" type indications with a "no change" type indication. It is also possible to arrange the OLPC/RNC such that only Eb/No-setpoint decreases are allowed. The RNC arrangement may

also be such that a temporary upper limit is set for the Eb/No-setpoint allowing a normal operation of the OLPC/RNC as long as the limit is not exceeded. The limit may equal or be different to that in use in the base station. If the limit is exceeded, use of any excessive setpoint values is prevented at the RNC and thus this embodiment corresponds the use of an upper limit at the BS.

It is also possible to have the outer loop functionality frozen or limited such that all or a selected number of mobile stations communicating with the base station are influenced, i.e. that the power levels of all or selected connections are cut, frozen or held below a certain limit. The connections may also be set into a priority order. In the latter instance the procedure can be such that the power levels of the lowest priority connections are limited and/or frozen first, and the highest priority connections are limited as last, if at all. The priority order classification of the connections may be based on the type of the subscription. A possibility is to use the type of the ongoing connection as basis for the prioritisation. For instance, speech, data and video connections may have different priorities. The same applies for "normal" calls, calls to emergency numbers, business calls, "hotline" calls and so on.

The OLPC/RNC freezing and/or limitation procedure may occur after the interference level or some other indication of a power limitation situation is signalled from the BS to the RNC. As explained, the RR indication message is sent periodically (e.g. in periods between 100ms to 1s). Now, if the interference value $PrxTotal$ exceeds $PrxTargetBS$ ($= PrxTarget + PrxOffset$) as discussed above, the OLPC/RNC can

be limited or frozen only after the indication of this has been received and processed at the RNC.

If the setpoint values at the BS are not allowed to follow the OLPC/RNCs from the RNC, the RNC Eb/No-setpoint 16 may start to differ from the Eb/No-setpoint 17 used by the BS for the closed loop functionality 18. This is due the fact that in most cases there will be a delay before the RNC 5 receives the overload indication 14 from the BS 4 and thus before the RNC may take similar actions to the BS. In other words, if an overload or another power limitation situation is detected, the two Eb/No-setpoints 16 and 17 of Figure 2 start to drift because the outer loop PC generated by the RNC is no longer allowed to adjust the closed loop PC 18. This difference will be referred to in the following as drifting.

After the power limitation situation is over, the operation of the OLPC/BS and OLPC/RNC is returned to a normal mode. The Eb/No-setpoint drifting between the BS and the RNC has to be removed during the recovery after the overload situation is over ($\text{PrxTotal} < \text{PrxTargetBS}$) and the outer loop PC is again allowed to control the power levels. The base station can remove the drift internally because it knows the actual setpoint value 17 in at the base station 4 and also the setpoint value 16 in use at the RNC 5. Thus it is possible to set either the setpoint value 16 to equal with the actual setpoint 17 or vice versa before the operation is returned to a normal mode. In addition, history information can be used for the recovery, i.e. the setpoint values in the BS and the RNC can be returned to a value used by them before the power limitation situation was detected. It is also possible to use a default or nominal value to which the setpoint in the RNC

and/or in the BS is returned at the beginning of the normal mode.

However, in order to provide a controlled recovery and to
5 avoid any too "sharp" changes in the setpoint values, it may
be preferred that the returning to the appropriate setpoint
value is not done at once. This is especially the case when
the quality of the connection is substantially bad. Therefore
it may be preferred to use some procedure to gradually
10 decrease the drifting.

As shown by the flow chart of figure 8, the BS 4 may initiate
the recovery procedure by checking for a possible drift of
the Eb/No-setpoints when an Eb/No-setpoint down command is
15 received from the RNC 5. If the check is positive, i.e. an
existing drift is detected, the drifting is reduced instead
of the actual Eb/No-setpoint. When an Eb/No-setpoint up
command is received in BS, then the actual Eb/No-setpoint is
always increased if the cell is not overloaded.

20 Before explaining in more detail the embodiments aimed for
solving the drifting problem, the arrangements of Figures 3
and 4 will be briefly discussed. It is noted that even though
Figures 3 and 4 disclose a more complex communication network
25 arrangement than Figure 2, the following embodiments can also
be implemented in the Figure 2 implementation.

Figure 3 shows a situation in which a mobile station MS is
controlled by two separate base stations 4 and 4' (e.g.
30 during a handover procedure). A1 and A2 designate the first
setpoints corresponding the setpoint 16 of Figure 2 in the
respective base stations. The second setpoint of the base
stations is correspondingly designated by B1 and B2. The RNC

5 controls Eb/No-setpoints of the base stations 4 and 4' by providing both base stations with relative outer loop power control (UP/DOWN) over an exemplifying Iub interface 19.

5 Figure 4 shows an embodiment in which the mobile station is subjected to a soft handover procedure. As in the above, the outer loop PC of a radio network controller can control several Eb/No-setpoints in several BSs. However, Figure 4 discloses the possibility that all Eb/No-setpoints in a BS
10 are not controlled by the same controller. In this kind of situation one of the controllers is the main controller while the other controller is used for assisting in the control of the station during the handover proceedings. In Figure 4 the main controller comprises a serving RNC (S-RNC) 5 and the
15 assisting controller comprises a drifting RNC (D-RNC) 5'. The serving and drifting RNC are connected to each other over an exemplifying Iur interface 20. Since the overload indication has now to be transmitted from the BS1 to the serving RNC 5 over two interfaces 19 and 20 and also through the drifting
20 RNC 5', the delay is even longer than what it would be in Figures 2 or 3.

The serving RNC 5 of Figure 4 controls the outer loop PC. However, the load control is performed by the load control 11
25 of the drifting RNC 5'. This means that in the case of a power limitation situation (overload at BS1 in Figure 4), the outer loop PC functionality performed by the serving RNC is not interrupted, and thus the used Eb/No-setpoint (B1) and Eb/No-setpoint of RNC (A,A1) start to drift. Moreover, the
30 Eb/No-setpoints (A2,B2) used for other handover branches can also start to increase. However, this does not cause uplink (UL) power increase as long as BS1 can control power of MS in addition to BS2. The reason for this is that the MS will not

increase its transmission power as long as it receives at least one DOWN command from at least one base station.

In a normal situation A1 A2 A and B1 A1 and B2 A2 in Figures 3 and 4. Because of the overload at the BS1 the Eb/No-setpoints have started to drift. The controlling RNC allows the system to return to the normal PC functionality after the radio resource indication measurements have indicated that the PrxTotal is below the set PrxTargetBS. After the cell has returned back on the normal load state (PrxTotal < PrxTargetBS) the outer loop PC is allowed again to control the power levels at the BS. At this stage a drifting detection unit 21 can define the amount of the drifting.

When the normal operation of the power control functionality is allowed again, the drifting of the Eb/No-setpoints has to be reduced. Base station BS1 can remove the drift (A1<>B1, A2<>B2) internally, because it knows the actual used value (B1,B2) and also the value in use in the RNC (A1,A2). However, in order to avoid any too sharp changes in the setpoint values, a gradual Eb/No-setpoint adjustment can be accomplished. This can be done e.g. such that when an Eb/No-setpoint down command is received from the RNC 5, the BS checks drift of Eb/No-setpoints. If the check is positive the drift is reduced instead of the actual Eb/No-setpoint. When an Eb/No-setpoint up command is received in BS, then the actual Eb/No-setpoint is always increased if the cell is not overloaded.

Table 1 of Figure 5 shows various stages of the embodiment for reducing a drift of Eb/No-setpoints between a BS and a RNC when using the following parameters.

SetUp = 0.5 dB
StepDown = 0.1 dB
Initial Eb/No-setpoint = 4.1 dB

5 It is noted that Table 1 shows the operation of an exemplifying power control mechanism using relative adjustments. However, the herein described principles can also be applied to a power control mechanism using absolute adjustment of the power levels.

10

In Table 1 "A" is the Eb/No-setpoint of the RNC. "A1" and "A2" are the outer loop PC Eb/No-setpoint values of BS1 and BS2, respectively. BS1 and BS2 are both controlled by the same RNC. "B1" and "B2" are the Eb/No-setpoints used by the closed loop PC. "B1" and B2" are controlled by the outer loop PC of the BS. "OFF" means that the outer loop PC functionality is switched off. In other words, when the OLPC is in "OFF" state, the adjustment of "B1" and "B2" is not allowed in base stations regardless the commands transmitted by the OLPC. Correspondingly, adjustment of the "A1" and "A2" values is not allowed in the RNC. When the OLPC is switched "ON", this means that outer loop PC functionality is allowed again.

15

20

25

30

As explained, the OLPC/BS at the base station of the overloaded cell is frozen before the OLPC/RNC at the RNC becomes frozen and therefore an Eb/No-setpoint drifting may exist between the outer loops of the base station 4 and the radio network controller 5. Although the drifting can be eliminated by using the algorithm described above, this may not be fast enough procedure in all occasions and some further processing may be required.

For instance, the OLPC/RNC might already have been escalated/diverged, i.e. the Eb/No-setpoint of the OLPC/RNC may have raised substantially (several dBs) during the last RR indication period. This is caused partially because the RR indication period (i.e. how often the RR indications are sent) may be substantially long, wherein the OLPC/RNC will be frozen a long time (up to one RR indication period) after the OLPC/BS of the overloaded cell was frozen. The freezing of the OLPC/BS may, however, have lead into a generation of numerous frame errors (FE). The frame errors will increase the FER. The increased FER will then further unnecessarily increase the Eb/No-setpoint of the OLPC/RNC, and this will increase further the drifting between the OLPC/BS and the OLPC/RNC.

The above phenomena is one of the reasons why the normal functionality of the OLPC/RNC may not be enough right after the power limitation situation is over and the limiting or freezing of the OLPC/BS and OLPC/RNC is cancelled. The OLPC/RNC Eb/No-setpoint may have been drifted several dBs above the situation the Eb/No-setpoint was during the previous RR indication period just before the power limitation is encountered in the RNC by a new RR indication message from the BS. The OLPC/RNC drift can be defined in the following manner:

$$\text{OLPC/RNC DRIFT} = \text{Eb/No}_2 - \text{Eb/No}_1$$

where

Eb/No₂ is the Eb/No-setpoint at the point when the overload situation is over and the OLPC/RNC is no longer frozen; and

E_b/N_{o1} is the last E_b/N_o -setpoint of a RR indication period preceding the RR indication sent from the overloaded BS.

5 The example presented in Table 2 of Figure 6 will clarify further the embodiment. In Table 2 E_b/N_{o1} is the last E_b/N_o -setpoint of the previous RR indication period preceeding the RR indication sent from the overloaded BS. E_b/N_{o2} is the E_b/N_o -setpoint at the point of time when the overload
10 situation is over and the OLPC/RNC is no longer frozen. "A" is the E_b/N_o -setpoint of the RNC. "A1" and "A2" are the outer loop PC E_b/N_o -setpoint values of the BS, which are controlled by the RNC. "B1" and "B2" are the E_b/N_o -setpoints used by the closed loop PC, and are controlled by the outer loop PC of BS
15 (OLPC/BS). "OFF" means that the outer loop PC functionality is switched off (i.e. adjusting of "B1" and "B2" is not allowed in the BS or in the case of the RNC, adjusting of "A1" and "A2" values is not allowed. "ON" means that the outer loop PC functionality is allowed to return to normal
20 operation.

It is possible that the base station and the controller have estimated a different amount of drift to be removed, e.g. due to the different time of initiating the limitation / freezing
25 procedures. Therefore the algorithm cab be such that after the OLPC/RNC is freed, the drift ($= E_b/N_{o2} - E_b/N_{o1}$) will be eliminated by decreasing the OLPC/RNC E_b/N_o -setpoint e.g. by 0.2 dB (normal decrease may be e.g. 0.1 dB) until the drift equals zero or a new Frame Error occurs. At this stage the
30 drift elimination algorithm at the RNC is cancelled, the E_b/N_o -setpoint is increased by e.g. 0.5 dB and a normal OLPC/RNC action will follow. However, the OLPC/BS drifting

prevention algorithm described above may still operate until the drift thereof is removed in its entirety.

5 It should be appreciated that whilst embodiments of the present invention have been described in relation to mobile stations, embodiments of the present invention are applicable to any other suitable type of user equipment.

10 The data is described as being in packet form. In alternative embodiments of the invention the data may be sent in any suitable format.

15 The embodiment of the present invention has been described in the context of a CDMA system. This invention is also applicable to any other access techniques including frequency division multiple access or time division multiple access as well as any hybrids thereof.

20 The embodiment of the invention has discussed the interaction between a radio network controller and a base station. Embodiments of the present invention can be applicable to other network elements where applicable.

25 It is also noted herein that while the above describes one exemplifying embodiment of the invention, there are several variations and modifications which may be made to the disclosed solution without departing from the scope of the present invention as defined in the appended claims.

Claims

1. A method in a communication system, said system comprising a controller and a first station for communication with a second station with variable transmission power over a radio connection, wherein the controller provides the first station with a target for a transmission parameter of the radio connection and the first station adjusts the transmission power of the second station on basis of the target, comprising:
 - monitoring for a predefined condition;
 - upon occurrence of the predefined condition, preventing use of a target for the transmission parameter exceeding a limit value for the target for the transmission parameter.
2. A method according to claim 1, wherein use of a target for the transmission parameter exceeding the limit value is prevented at the first station.
3. A method according to claim 1 or 2, wherein use of a target for the transmission parameter exceeding the limit value is prevented at the controller.
4. A method according to any of the preceding claims, wherein the limit value equals with the target for the transmission parameter in use at the moment of detecting the predefined condition.
5. A method according to claim 4, wherein the target for the transmission parameter is held at the limit value until the condition is over.

6. A method according to any of the preceding claims, wherein the predefined condition comprises a temporary power limitation situation at the first station.

5 7. A method according to any of the preceding claims, wherein the predefined condition comprises an overload situation at the first station.

8. A method according to any of the preceding claims,
10 wherein the predefined condition comprises a failure in the communication system.

9. A method according to any of the preceding claims, wherein the monitoring of the occurrence of the predefined
15 condition is based on determination of the interference power of the radio connection.

10. A method in according to any of the preceding claims, wherein the target for the transmission parameter comprises
20 connection quality target.

11. A method according to any of claims 1 to 9, wherein the target for the transmission parameter comprises signalling energy/noise target.

25

12. A method according to any of claims 1 to 9, wherein the target for the transmission parameter comprises a target transmission power level of the transmission from the second station.

30

13. A method according to any of the preceding claims, wherein the step of preventing the target for the transmission parameter to exceed the limit value comprises

ignoring power control commands at the first station until the predefined condition is over.

14. A method according to any of the preceding claims,
5 wherein the step of preventing of the target for the transmission parameter to exceed the predefined value comprises preventing a generation of new power control commands at the controller until the predefined condition is over.

10

15. A method according to any of the preceding claims, wherein the controller controls the transmission powers between the first station and the second station by means of outer loop power control.

15

16. A method in accordance with any of the preceding claims, further comprising steps of:

receiving the target for the transmission parameter from the controller at the first station;

20

creating a further target for the transmission parameter at the first station for use in the transmission power adjustment, wherein the further target corresponds the target received from the controller until the predefined condition is detected whereafter the further target is prevented to
25 exceed the limit value for the target and the target received from the controller is ignored.

17. A method in accordance with any of the preceding claims, further comprising steps of:

30

detecting a difference between the value of the target for the transmission parameter provided by the controller and the value of the target for the transmission parameter used

for power control by the first station after the predefined condition is over; and

reducing the difference between the said two target values.

5

18. A method according to claim 17, wherein reducing of the difference is based on history information of the target used for the power control prior the detection of the condition.

10 19. A method according to claim 17, wherein the step of reducing the difference comprises changing the value of the target provided by the controller to equal values of the target used by the first station for controlling the transmission power at the moment the condition is detected to
15 be over.

20. A method according to any of claims 17 to 19, wherein the difference between the said two target values is reduced gradually.

20

21. A method according to claim 20, wherein the gradual reducing of the difference comprises steps of;

25 ignoring a request from the controller to reduce the transmission power until the difference between the target values used by the first station and provided by the controller is below a predefined level; and

subtracting a predefined amount from the difference as response to said request.

30 22. A method according to claim 21, wherein the predefined amount corresponds the requested decrease of the transmission power.

23. A method according to any of claim 20 or 21, wherein the gradual reducing of the difference comprises requesting a decrease of the transmission power by an amount that is greater than the amount of decrease requested in a normal
5 mode of operation until the difference between the target values used by the first station and provided by the controller is below a predefined level.

24. A method according to any of the preceding claims,
10 wherein the transmission power control is based on use of relative power control requests.

25. A method according to any of the preceding claims, wherein the communication system comprises a further station
15 similar to the first station and the controller controls the transmission power of the second station by providing both the first and the further station with targets for the transmission parameter.

20 26. A method according to any of the preceding claims, wherein connections between the first station and other stations are adjusted in a priority order.

27. A method according to any of the preceding claims,
25 wherein the controller comprises a radio network controller of a cellular communication system, the first station comprises a base station of the cellular communication system and the second station comprises a mobile station, and wherein the transmission power to be adjusted comprises
30 transmission power from at least one mobile station towards at least one base station.

28. A communication system, comprising:

a controller arranged to control transmission power of stations;

a first station and a second station capable of providing a communication path therebetween, wherein the
5 controller is arranged to provide the first station with a target for use in control of the transmission power of the second station;

monitoring means for monitoring for a predefined condition; and

10 means for preventing use of a target for the transmission parameter exceeding a limit value for the target for the transmission parameter upon occurrence of the predefined condition.

15 29. A communication system according to claim 28, further comprising at the first station a first target functionality for receiving the target from the controller and a further target functionality for generating a further target for the transmission parameter, wherein the arrangement is such that
20 the further target is used for the power control of the second station and corresponds the target provided by the controller unless the predefined condition is detected whereafter the further target is set such that the limit value for the target for the transmission parameter is not
25 exceeded.

30. A communication system according to claim 29, further comprising detecting means for detecting a difference between the target and the further target and recovery means for
30 reducing the difference after the predefined condition is over.

31. A communication system according to claim 30, wherein the recovery means are arranged to reduce the difference gradually.

5 32. A communication system according to any of claims 28 to 31, wherein the controller comprises a radio network controller of a cellular communication system, the first station comprises a base station of the cellular communication system and the second station comprises a
10 mobile station, and wherein the transmission power to be adjusted comprises transmission power from at least one mobile station towards at least one base station.

32. A station of a communication system, said station
15 controlling transmission power of a further station transmitting towards the station, wherein the station is arranged to:

receive a target for a transmission parameter provided by a controller of the communications system for use in the
20 control of transmission power of the further station;

monitor for a predefined condition; and

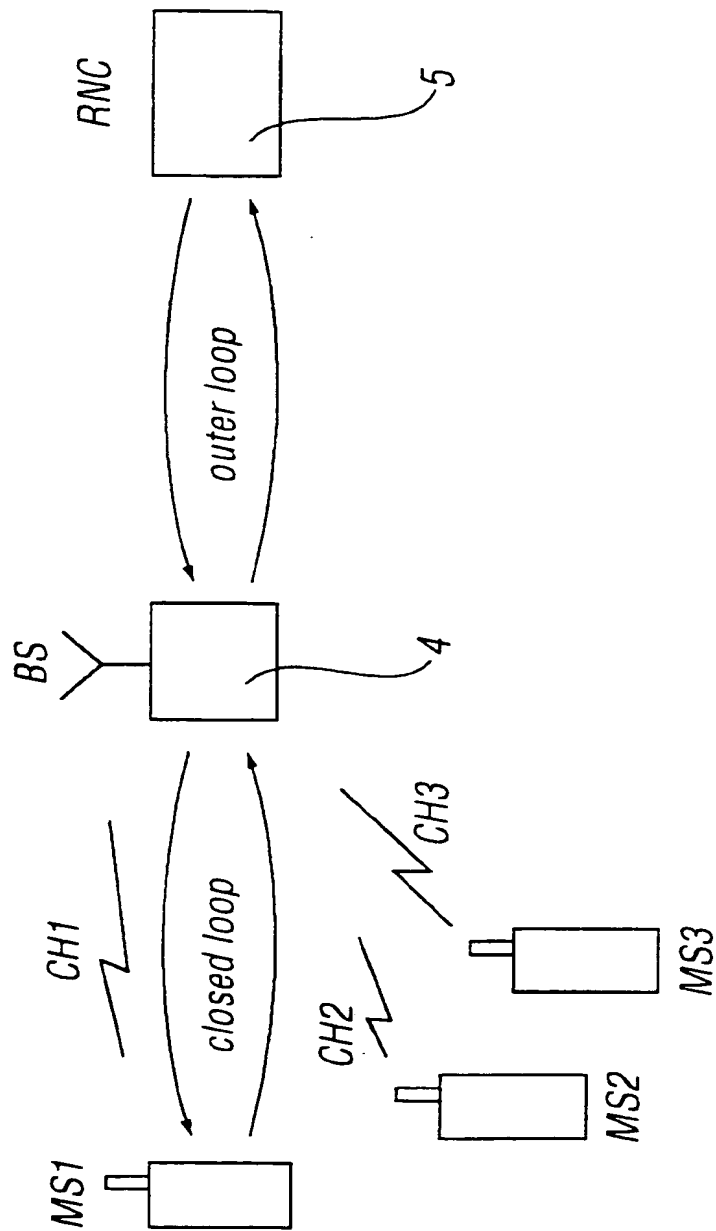
upon occurrence of the predefined condition, to prevent use of targets for the transmission parameter exceeding a limit value for the target for the transmission parameter.

25

33. A station according to claim 32, further comprising a first target functionality for receiving the target for the transmission parameter provided by the controller and a further target functionality for generating a further target
30 for the transmission parameter, wherein the arrangement is such that the further target is used for the power control of the further station and corresponds the target received from the controller unless the predefined condition is detected

whereafter the further target is set by the further target functionality such that the limit value for the target is not exceeded.

- 5 34. A station according to claim 33, further comprising detecting means for detecting a difference between the target and the further target and recovery means for reducing the difference after the predefined condition is over.
- 10 35. A station according to claim 34, wherein the recovery means are arranged to reduce the difference gradually.

FIG. 1

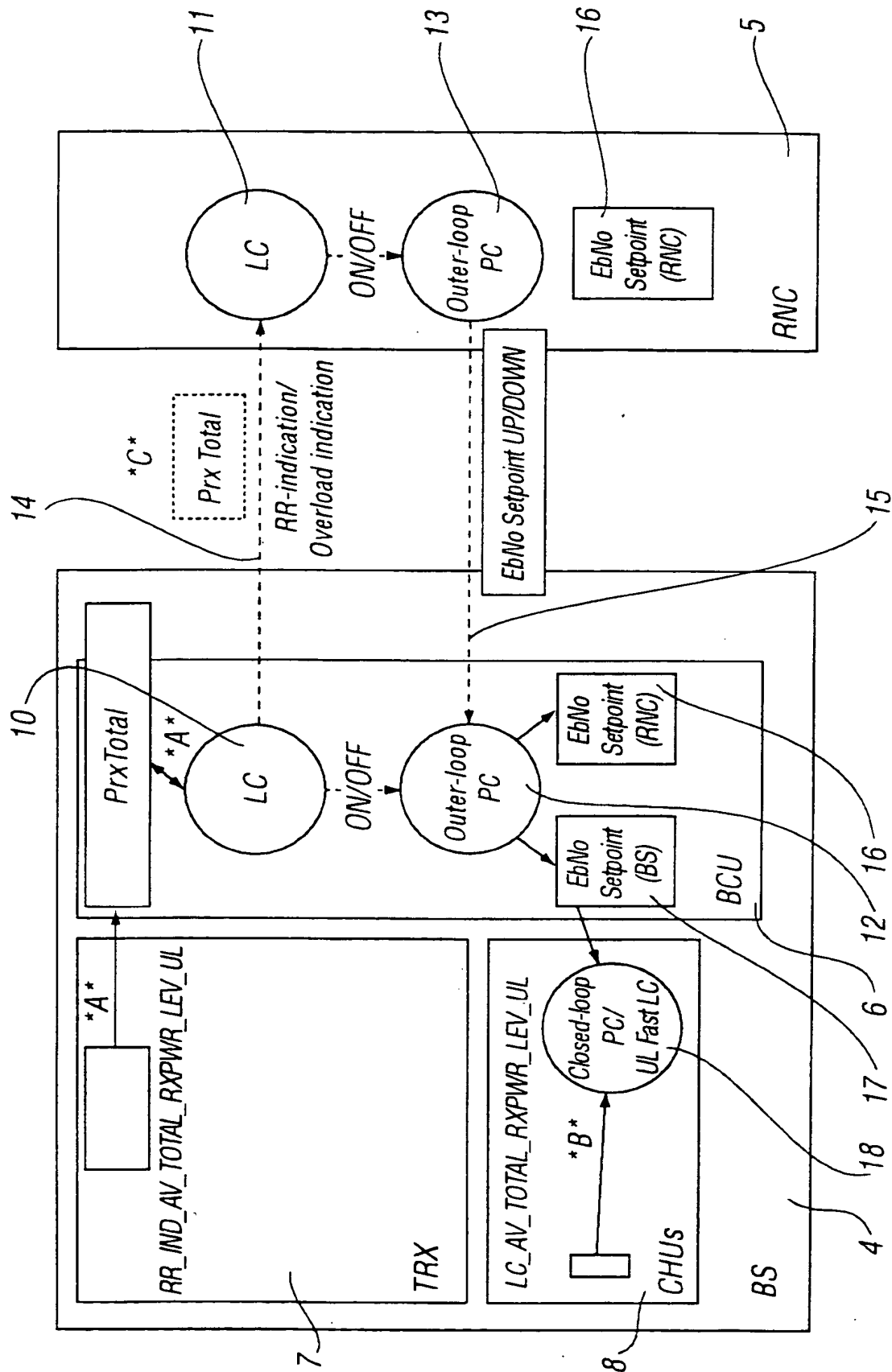


FIG. 2

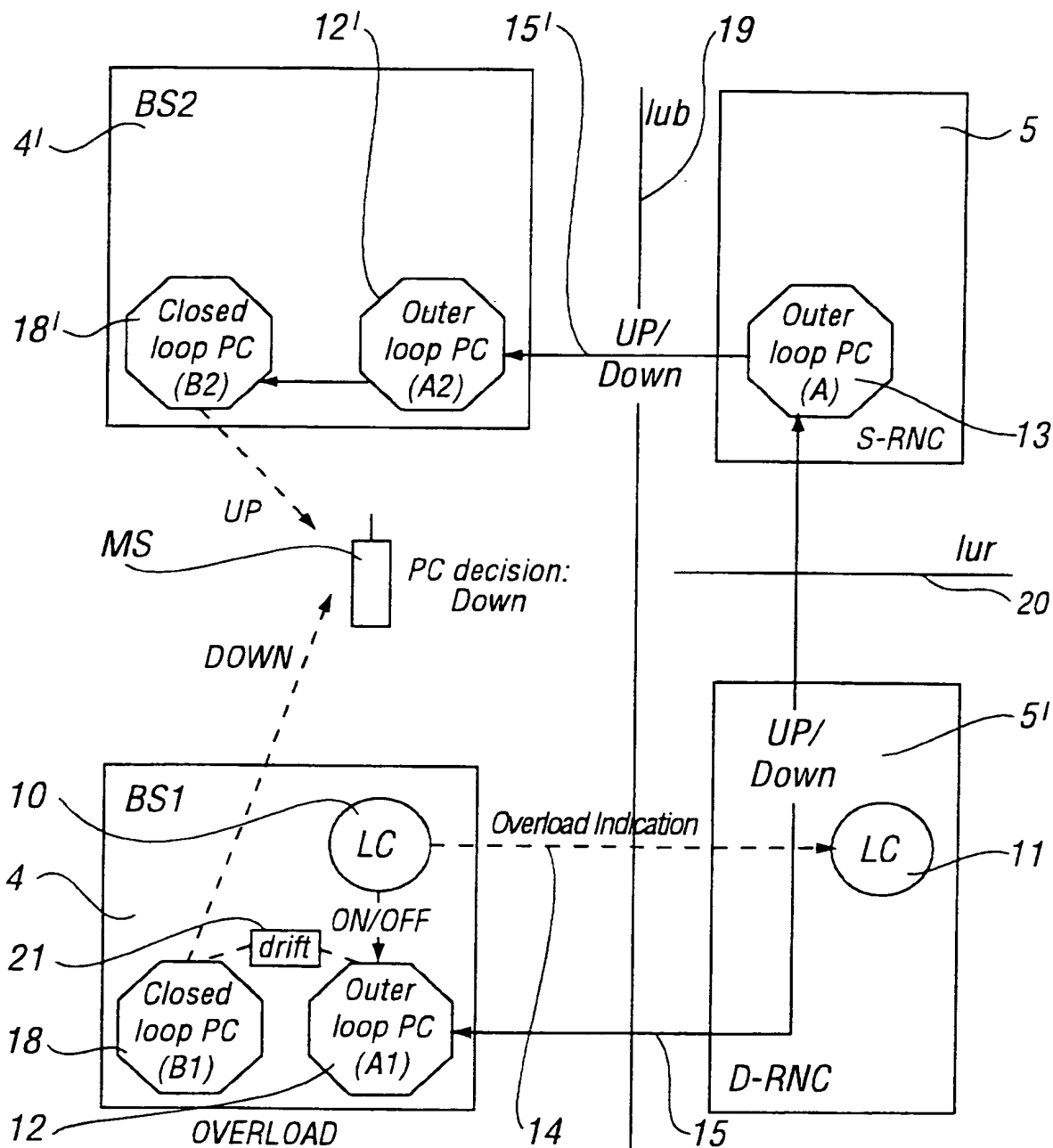


FIG. 4

TABLE 1

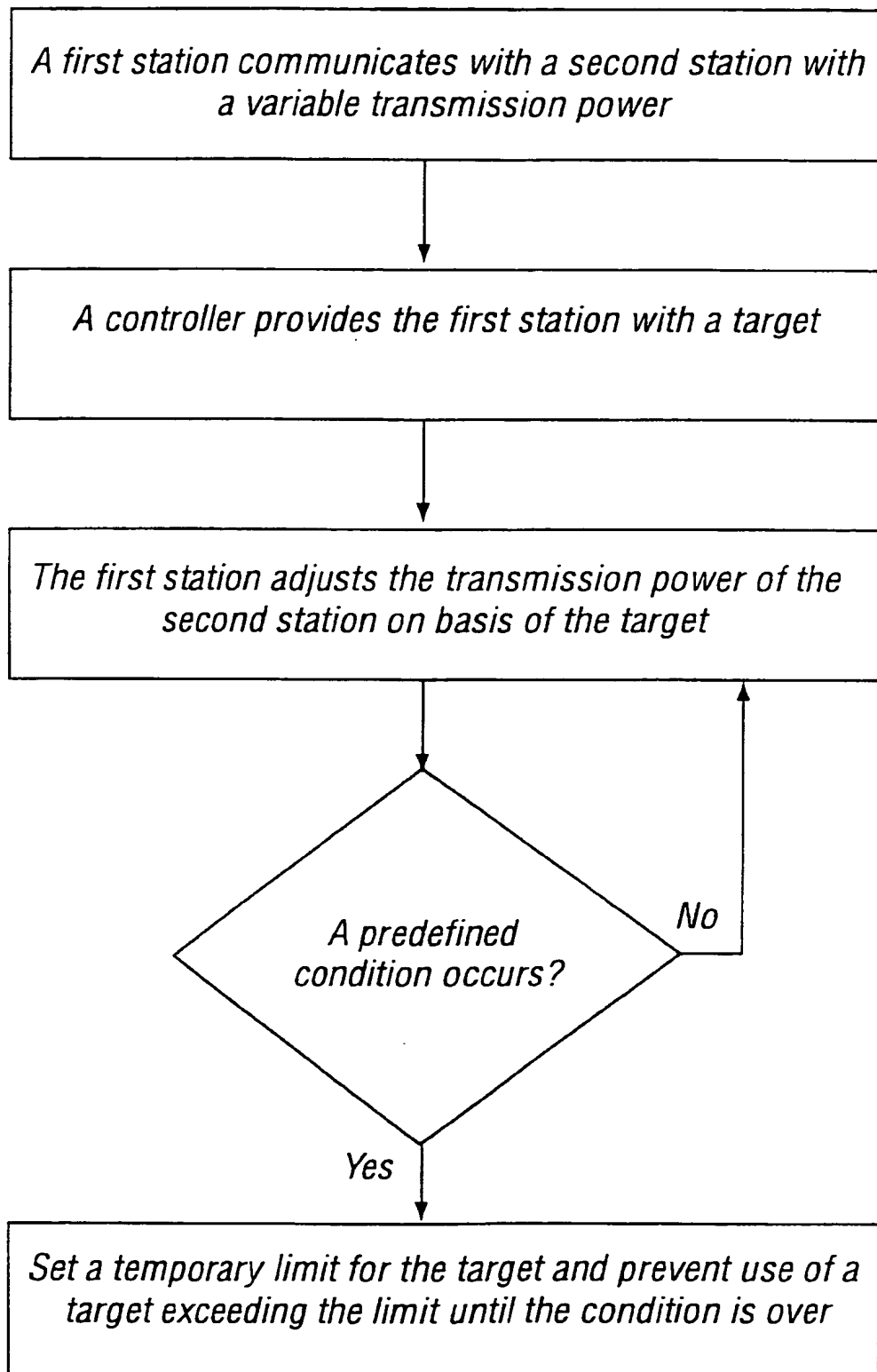
RNC <i>A</i>	lub <i>Command</i>	BS1/BS2 <i>A1/A2</i>	BS2 <i>B2</i>	BS1 <i>B1</i>	BS1 <i>DriftB1<>A1</i>
4.1dB		4.1db	4.1db	4.1db	0.0db
Normal functionality					
4.0	StepDown	4.0	4.0	4.0	0.0
4.5	StepUp	4.5	4.5	4.5	0.0
<i>Cell 1 is overloaded, OLPC/BS1 OFF</i>					
5.0	StepUP	5	5	4.5	+0.5
4.9	StepDown	4.9	4.9	4.4	+0.5
<i>Indication to RNC OLPC/RNC OFF</i>					
4.8	Stepdown	4.8	4.3	4.3	+0.5
<i>Cell1 is in normal load, OLPC/BS1 ON</i>					
4.7	StepDown	4.7	4.7	4.3	+0.4
4.6	StepDown	4.6	4.6	4.3	+0.3
4.5	StepDown	4.5	4.5	4.3	+0.2
<i>RNC notices that cell 1 is not overloaded OLPC/RNC ON</i>					
5.0	StepUP	5.0	5.0	4.8	+0.2
4.9	StepDown	4.9	4.9	4.8	+0.1
4.8	StepDown	4.8	4.8	4.8	0.0
4.7	stepDown	4.7	4.7	4.7	0.0

FIG. 5

TABLE 2

RNC A	Iub Command	BS1/BS2 A1/A2	BS2 B2	BS1 B1	BS1 DriftB1<>A1
4.1 dB (=EbNo1)		4.1db	4.1db	4.1db	0.0db
Normal functionality					
4.0	StepDown	4.0	4.0	4.0	0.0
4.5	StepUp	4.5	4.5	4.5	0.0
Cell 1 is overloaded, OLPC/BS1 OFF					
5.0	StepUP	5	5	4.5	+0.5
5.5	StepUP	5.5	5.5	4.5	+1.0
Indication to RNC OLPC/RNC OFF					
5.4	Stepdown	5.4	5.4	4.4	+1.0
Cell1 is in normal load, OLPC/BS1 ON					
5.3	StepDown	5.3	5.3	4.4	+1.0
5.2	StepDown	5.2	5.2	4.4	+0.9
5.1 (=EbNo1)	StepDown	5.1	5.1	4.4	+0.8
RNC notices that cell 1 is not overloaded OLPC/RNC ON					
4.9 (-0.2)	StepDown	4.9	4.9	4.4	+0.5
4.7 (-0.2)	StepDown	4.7	4.7	4.4	+0.3
4.5 (-0.2)	StepDown	4.5	4.5	4.4	+0.1
4.3 (-0.2)	StepDown	4.3	4.3	4.3	No drift between BS and RNC EbNo's
4.1 (-0.2) (=EbNo1,the RNC-drift=0)	StepDown	4.1	4.1	4.1	

FIG. 6

FIG. 7

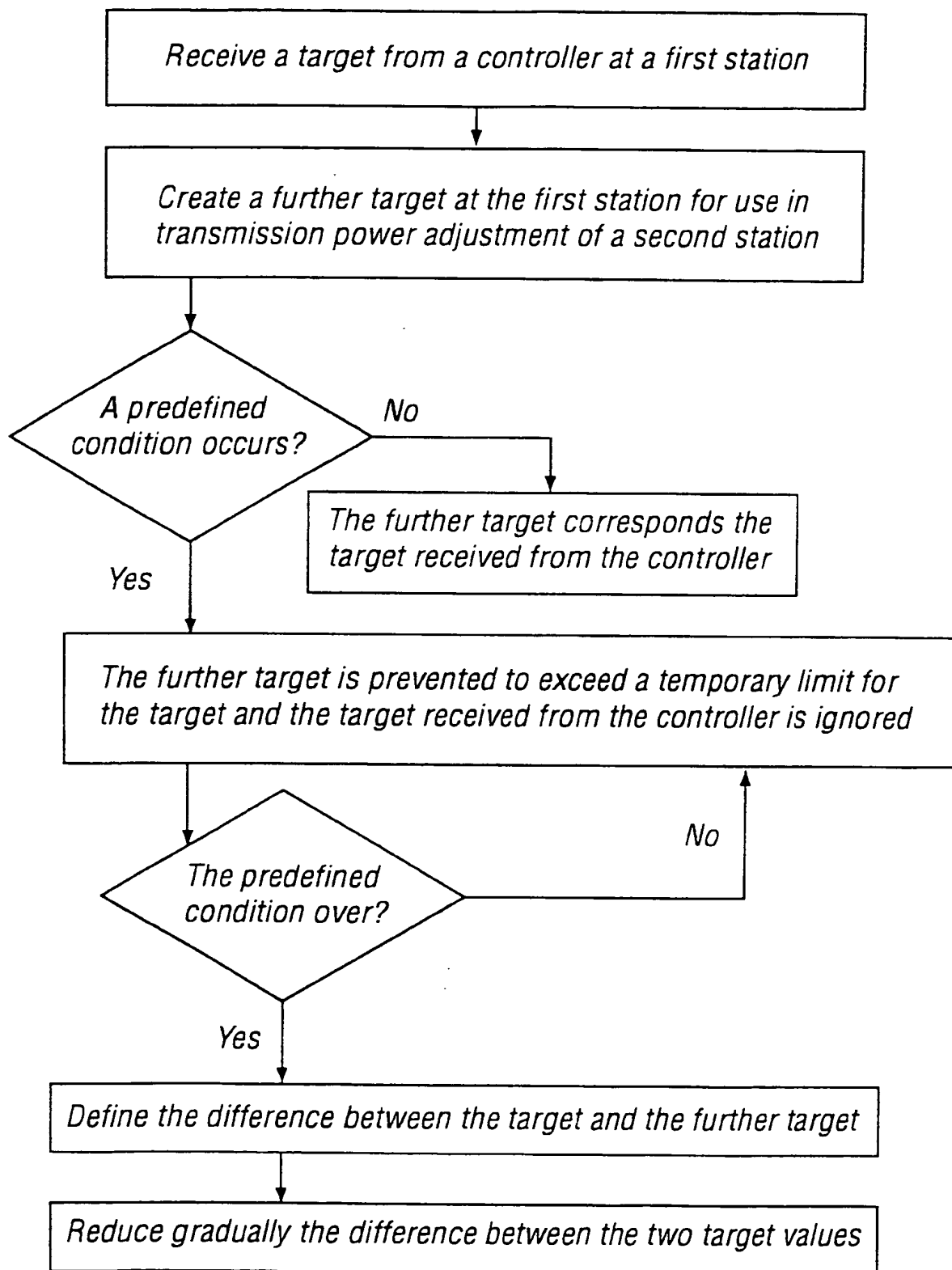


FIG. 8

INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 00/09105

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04B7/005

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H04B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y A	<p>US 5 333 175 A (ARIYAVISITAKUL SIRIKIAT ET AL) 26 July 1994 (1994-07-26)</p> <p>abstract; figures 4,5 column 9, line 30 -column 10, line 22 column 13, line 42 -column 14, line 53 column 16, line 65 -column 17, line 20 --- -/--</p>	<p>1-5, 13, 15, 16, 24-29, 32-34 6-12, 14</p>

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

A document defining the general state of the art which is not considered to be of particular relevance

E earlier document but published on or after the international filing date

L document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

O document referring to an oral disclosure, use, exhibition or other means

P document published prior to the international filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

G document member of the same patent family

Date of the actual completion of the international search

29 November 2000

Date of mailing of the international search report

22/12/2000

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Sieben, S

INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 00/09105

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 99 41850 A (NOKIA TELECOMMUNICATIONS OY ;AALTO RISTO (FI); KOHONEN PEKKA (FI);) 19 August 1999 (1999-08-19)	1-5, 13, 15, 16, 24-29, 32-34 9-12
A	abstract; figures 1-3, 7, 8 page 3, line 5 - line 19 page 6, line 10 - line 26 page 8, line 1 - line 14 page 13, line 13 - page 16, line 6 ---	
A	US 5 774 785 A (KARLSSON PATRIK) 30 June 1998 (1998-06-30) column 2, line 23 - line 55 column 5, line 6 - line 19; figure 2A column 9, line 37 - column 10, line 19; figures 3, 5, 7 ----	1, 7, 9-12, 15, 16, 24, 25, 27-29, 32-34
A	EP 0 936 753 A (NOKIA MOBILE PHONES LTD) 18 August 1999 (1999-08-18) page 3, line 51 - page 4, line 5 page 11, line 55 - page 12, line 18 page 13, line 32 - line 36 page 14, line 37 - line 46; figures 4, 5 ----	1, 2, 7, 9-12, 15, 16, 24-29, 32-34
A	US 5 924 043 A (TAKANO MICHIAKI) 13 July 1999 (1999-07-13) column 18, line 9 - column 19, line 41; figures 10, 25-29 ----	1, 2, 6, 9-13, 16, 24, 27-29, 32-34
P, X	WO 00 45528 A (QUALCOMM INC) 3 August 2000 (2000-08-03) abstract; figures 4, 5 page 6, line 8 - line 25; figure 1 claims 1, 8 -----	1-8, 10-12, 15, 24, 25, 27-29, 32-34

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP 00/09105

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5333175 A	26-07-1994	NONE	
WO 9941850 A	19-08-1999	FI 980348 A FI 981811 A AU 2426899 A	17-08-1999 17-08-1999 30-08-1999
US 5774785 A	30-06-1998	AU 719567 B AU 3280197 A BR 9709832 A CA 2258230 A WO 9749198 A	11-05-2000 07-01-1998 10-08-1999 24-12-1997 24-12-1997
EP 0936753 A	18-08-1999	FI 980343 A JP 11284570 A	14-08-1999 15-10-1999
US 5924043 A	13-07-1999	JP 10126337 A	15-05-1998
WO 0045528 A	03-08-2000	AU 2976400 A	18-08-2000

COPY

The demand must be filed directly with the competent International Preliminary Examining Authority or, if more Authorities are competent, with the one chosen by the applicant. The full name or two-letter code of that Authority may be indicated by the applicant on the line below:

IPEA/ EP

PCT

CHAPTER II

DEMAND

under Article 31 of the Patent Cooperation Treaty:

The undersigned requests that the international application specified below be the subject of international preliminary examination according to the Patent Cooperation Treaty and hereby elects all eligible States (except where otherwise indicated).

For International Preliminary Examining Authority use only	
Identification of IPEA	Date of receipt of DEMAND
Box No. I IDENTIFICATION OF THE INTERNATIONAL APPLICATION	
Applicant's or agent's file reference 102753/JPR	
International application No. PCT/EP00/09105	International filing date (day/month/year) 14 September 2000
(Earliest) Priority date (day/month/year) 16 September 1999	
Title of invention POWER CONTROL IN A COMMUNICATION SYSTEM	
Box No. II APPLICANT(S)	
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.) Nokia Networks Oy Keilalahdentie 4 FIN-02150 ESPOO Finland	Telephone No.
	Facsimile No.
	Teleprinter No.
	Applicant's registration No. with the Office
State (that is, country) of nationality: FI	State (that is, country) of residence: FI
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.) LAAKSO, Janne Paraistentie 17 c 44 FIN-00280 Helsinki Finland	
State (that is, country) of nationality: FI	State (that is, country) of residence: FI
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.) SAHINOJA, Jari Sepelkyyhkyntie 3 B 24 FIN-02660 Espoo Finland	
State (that is, country) of nationality: FI	State (that is, country) of residence: FI
<input checked="" type="checkbox"/> Further applicants are indicated on a continuation sheet.	

Continuation of Box No. II APPLICANT(S)

If none of the following sub-boxes is used, this sheet should not be included in the demand.

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

HOLMA, Harri
Ripusuontie 92 C
FIN-00660 Helsinki
Finland

State (that is, country) of nationality:

FI

State (that is, country) of residence:

FI

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

State (that is, country) of nationality:

State (that is, country) of residence:

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

State (that is, country) of nationality:

State (that is, country) of residence:

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

State (that is, country) of nationality:

State (that is, country) of residence:

☐ Further applicants are indicated on another continuation sheet.

Box No. III AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCEThe following person is ☒ agent ☐ common representativeand ☒ has been appointed earlier and represents the applicant(s) also for international preliminary examination.☐ is hereby appointed and any earlier appointment of (an) agent(s)/common representative is hereby revoked.☐ is hereby appointed, specifically for the procedure before the International Preliminary Examining Authority, in addition to the agent(s)/common representative appointed earlier.Name and address: *(Family name followed by given name; for a legal entity, full official designation.
The address must include postal code and name of country.)*RUUSKANEN, Juha-Pekka
PAGE WHITE & FARRER
54 Doughty Street
London WC1N 2LS
United KingdomTelephone No.
020 7831-7929Facsimile No.
020 7831-8040Teleprinter No.
8955681

Agent's registration No. with the Office

☐ **Address for correspondence:** Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.**Box No. IV BASIS FOR INTERNATIONAL PRELIMINARY EXAMINATION****Statement concerning amendments:***

1. The applicant wishes the international preliminary examination to start on the basis of:

☒ the international application as originally filedthe description ☒ as originally filed☐ as amended under Article 34the claims ☒ as originally filed☐ as amended under Article 19 (together with any accompanying statement)☐ as amended under Article 34the drawings ☒ as originally filed☐ as amended under Article 342. ☐ The applicant wishes any amendment to the claims under Article 19 to be considered as reversed.3. ☐ The applicant wishes the start of the international preliminary examination to be postponed until the expiration of 20 months from the priority date unless the International Preliminary Examining Authority receives a copy of any amendments made under Article 19 or a notice from the applicant that he does not wish to make such amendments (Rule 69.1(d)). *(This check-box may be marked only where the time limit under Article 19 has not yet expired.)*

* Where no check-box is marked, international preliminary examination will start on the basis of the international application as originally filed or, where a copy of amendments to the claims under Article 19 and/or amendments of the international application under Article 34 are received by the International Preliminary Examining Authority before it has begun to draw up a written opinion or the international preliminary examination report, as so amended.

Language for the purposes of international preliminary examination: EN☒ which is the language in which the international application was filed.☐ which is the language of a translation furnished for the purposes of international search.☐ which is the language of publication of the international application.☐ which is the language of the translation (to be) furnished for the purposes of international preliminary examination.**Box No. V ELECTION OF STATES**The applicant hereby elects all eligible States *(that is, all States which have been designated and which are bound by Chapter II of the PCT)*

excluding the following States which the applicant wishes not to elect:

Box No. VI CHECK LIST

The demand is accompanied by the following elements, in the language referred to in Box No. IV, for the purposes of international preliminary examination:

- | | | | |
|--|---|---|--------|
| 1. translation of international application | : | | sheets |
| 2. amendments under Article 34 | : | | sheets |
| 3. copy (or, where required, translation) of amendments under Article 19 | : | | sheets |
| 4. copy (or, where required, translation) of statement under Article 19 | : | | sheets |
| 5. letter | : | 1 | sheets |
| 6. other (<i>specify</i>) | : | | sheets |

For International Preliminary Examining Authority use only

- | received | not received |
|--------------------------|--------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> | <input type="checkbox"/> |

The demand is also accompanied by the item(s) marked below:

- | | |
|--|--|
| 1. <input checked="" type="checkbox"/> fee calculation sheet | 5. <input type="checkbox"/> statement explaining lack of signature |
| 2. <input type="checkbox"/> original separate power of attorney | 6. <input type="checkbox"/> sequence listing in computer readable form |
| 3. <input type="checkbox"/> original general power of attorney | 7. <input type="checkbox"/> other (<i>specify</i>): |
| 4. <input type="checkbox"/> copy of general power of attorney; reference number, if any: | |

Box No. VII SIGNATURE OF APPLICANT, AGENT OR COMMON REPRESENTATIVE

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the demand).

RUUSKANEN, Juha-Pekka.....(Agent)

For International Preliminary Examining Authority use only

1. Date of actual receipt of DEMAND:

2. Adjusted date of receipt of demand due to CORRECTIONS under Rule 60.1(b):

3. ☐ The date of receipt of the demand is AFTER the expiration of 19 months from the priority date and item 4 or 5, below, does not apply. ☐ The applicant has been informed accordingly.

4. ☐ The date of receipt of the demand is WITHIN the period of 19 months from the priority date as extended by virtue of Rule 80.5.

5. ☐ Although the date of receipt of the demand is after the expiration of 19 months from the priority date, the delay in arrival is EXCUSED pursuant to Rule 82.

For International Bureau use only

Demand received from IPEA on:

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF THE RECORDING
OF A CHANGE(PCT Rule 92bis.1 and
Administrative Instructions, Section 422)

From the INTERNATIONAL BUREAU

To:

RUUSKANEN, Juha-Pekka
Page White & Farrer
54 Doughty Street
London WC1N 2LS
ROYAUME-UNIRECEIVED
- 4 FEB 2002
ANSU

Date of mailing (day/month/year)

28 January 2002 (28.01.02)

Applicant's or agent's file reference

102753/JPR

International application No.

PCT/EP00/09105

International filing date (day/month/year)

14 September 2000 (14.09.00)

IMPORTANT NOTIFICATION

1. The following indications appeared on record concerning:

☒ the applicant ☐ the inventor ☐ the agent ☐ the common representative

Name and Address

NOKIA NETWORKS OY
Keilalahdentie 4
FIN-02150 Espoo
Finland

State of Nationality

FI

State of Residence

FI

Telephone No.

Facsimile No.

Teleprinter No.

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

☒ the person ☐ the name ☐ the address ☐ the nationality ☐ the residence

Name and Address

NOKIA CORPORATION
Keilalahdentie 4
FIN-02150 Espoo
Finland

State of Nationality

FI

State of Residence

FI

Telephone No.

Facsimile No.

Teleprinter No.

3. Further observations, if necessary:

4. A copy of this notification has been sent to:

☒ the receiving Office ☐ the designated Offices concerned
☐ the International Searching Authority ☒ the elected Offices concerned
☐ the International Preliminary Examining Authority ☐ other:The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer

Anne KARKACHI

Telephone No.: (41-22) 338.83.38

PATENT COOPERATION TREATY

WO 01/20806
PCT/EP00/09105

PCT

From the INTERNATIONAL BUREAU

NOTICE INFORMING THE APPLICANT OF THE COMMUNICATION OF THE INTERNATIONAL APPLICATION TO THE DESIGNATED OFFICES

(PCT Rule 47.1(c), first sentence)

To:

RUUSKANEN, Juha-Pekka
Page White & Farrer
54 Doughty Street
London WC1N 2LS
ROYAUME-UNI

RECEIVED
3 n MAR 2001

Date of mailing (day/month/year) 22 March 2001 (22.03.01)		
Applicant's or agent's file reference 102753/JPR		
IMPORTANT NOTICE		
International application No. PCT/EP00/09105	International filing date (day/month/year) 14 September 2000 (14.09.00)	Priority date (day/month/year) 16 September 1999 (16.09.99)
Applicant NOKIA NETWORKS OY et al		

1. Notice is hereby given that the International Bureau has communicated, as provided in Article 20, the international application to the following designated Offices on the date indicated above as the date of mailing of this Notice:
AU, KP, KR, US

In accordance with Rule 47.1(c), third sentence, those Offices will accept the present Notice as conclusive evidence that the communication of the international application has duly taken place on the date of mailing indicated above and no copy of the international application is required to be furnished by the applicant to the designated Office(s).

2. The following designated Offices have waived the requirement for such a communication at this time:
AE, AG, AL, AM, AP, AT, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EA, EE, EP, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OA, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU,
The communication will be made to those Offices only upon their request. Furthermore, those Offices do not require the applicant to furnish a copy of the international application (Rule 49.1(a-bis)).
3. Enclosed with this Notice is a copy of the international application as published by the International Bureau on 22 March 2001 (22.03.01) under No. WO 01/20806

REMINDER REGARDING CHAPTER II (Article 31(2)(a) and Rule 54.2)

If the applicant wishes to postpone entry into the national phase until 30 months (or later in some Offices) from the priority date, a **demand for international preliminary examination** must be filed with the competent International Preliminary Examining Authority before the expiration of 19 months from the priority date.

It is the applicant's sole responsibility to monitor the 19-month time limit.

Note that only an applicant who is a national or resident of a PCT Contracting State which is bound by Chapter II has the right to file a demand for international preliminary examination.

REMINDER REGARDING ENTRY INTO THE NATIONAL PHASE (Article 22 or 39(1))

If the applicant wishes to proceed with the international application in the **national phase**, he must, within 20 months or 30 months, or later in some Offices, perform the acts referred to therein before each designated or elected Office.

For further important information on the time limits and acts to be performed for entering the national phase, see the Annex to Form PCT/IB/301 (Notification of Receipt of Record Copy) and Volume II of the PCT Applicant's Guide.

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. (41-22) 740.14.35	Authorized officer J. Zahra Telephone No. (41-22) 338.83.38
--	---

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 102753/JPR	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/EP 00/09105	International filing date (day/month/year) 14/09/2000	(Earliest) Priority Date (day/month/year) 16/09/1999
Applicant NOKIA NETWORKS OY et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.



It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.



the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :



contained in the international application in written form.



filed together with the international application in computer readable form.



furnished subsequently to this Authority in written form.



furnished subsequently to this Authority in computer readable form.



the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.



the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

the text is approved as submitted by the applicant.



the text has been established by this Authority to read as follows:

TRANSMISSION POWER CONTROL IN A RADIO COMMUNICATION SYSTEM

5. With regard to the **abstract**,

the text is approved as submitted by the applicant.



the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

as suggested by the applicant.



because the applicant failed to suggest a figure.



because this figure better characterizes the invention.

7



None of the figures.

INTERNATIONAL SEARCH REPORT

International Application No

PC 00/09105

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04B7/005

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H04B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y A	<p>US 5 333 175 A (ARIYAVISITAKUL SIRIKIAT ET AL) 26 July 1994 (1994-07-26)</p> <p>abstract; figures 4,5 column 9, line 30 -column 10, line 22 column 13, line 42 -column 14, line 53 column 16, line 65 -column 17, line 20</p> <p>--- -/--</p>	<p>1-5, 13, 15, 16, 24-29, 32-34 6-12, 14</p>

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

° Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *&* document member of the same patent family

Date of the actual completion of the international search

29 November 2000

Date of mailing of the international search report

22/12/2000

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Sieben, S

INTERNATIONAL SEARCH REPORT

International Application No

PCT/JP 00/09105

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 99 41850 A (NOKIA TELECOMMUNICATIONS OY ;AALTO RISTO (FI); KOHONEN PEKKA (FI);) 19 August 1999 (1999-08-19)	1-5, 13, 15, 16, 24-29, 32-34 9-12
A	abstract; figures 1-3, 7, 8 page 3, line 5 - line 19 page 6, line 10 - line 26 page 8, line 1 - line 14 page 13, line 13 -page 16, line 6 ---	
A	US 5 774 785 A (KARLSSON PATRIK) 30 June 1998 (1998-06-30)	1, 7, 9-12, 15, 16, 24, 25, 27-29, 32-34
	column 2, line 23 - line 55 column 5, line 6 - line 19; figure 2A column 9, line 37 -column 10, line 19; figures 3, 5, 7 ---	
A	EP 0 936 753 A (NOKIA MOBILE PHONES LTD) 18 August 1999 (1999-08-18)	1, 2, 7, 9-12, 15, 16, 24-29, 32-34
	page 3, line 51 -page 4, line 5 page 11, line 55 -page 12, line 18 page 13, line 32 - line 36 page 14, line 37 - line 46; figures 4, 5 ---	
A	US 5 924 043 A (TAKANO MICHIAKI) 13 July 1999 (1999-07-13)	1, 2, 6, 9-13, 16, 24, 27-29, 32-34
	column 18, line 9 -column 19, line 41; figures 10, 25-29 ---	
P, X	WO 00 45528 A (QUALCOMM INC) 3 August 2000 (2000-08-03)	1-8, 10-12, 15, 24, 25, 27-29, 32-34
	abstract; figures 4, 5 page 6, line 8 - line 25; figure 1 claims 1, 8 -----	

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT 00/09105

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5333175	A	26-07-1994	NONE	
WO 9941850	A	19-08-1999	FI 980348 A	17-08-1999
			FI 981811 A	17-08-1999
			AU 2426899 A	30-08-1999
US 5774785	A	30-06-1998	AU 719567 B	11-05-2000
			AU 3280197 A	07-01-1998
			BR 9709832 A	10-08-1999
			CA 2258230 A	24-12-1997
			WO 9749198 A	24-12-1997
EP 0936753	A	18-08-1999	FI 980343 A	14-08-1999
			JP 11284570 A	15-10-1999
US 5924043	A	13-07-1999	JP 10126337 A	15-05-1998
WO 0045528	A	03-08-2000	AU 2976400 A	18-08-2000



P.B. 5818 - Patentlaan 2
2280 HV Rijswijk (ZH)
☎ +31 70 340 2040
TX 31651 epo nl
FAX +31 70 340 3016

Europäisches
Patentamt

Zweigstelle
in Den Haag

European
Patent Office

Branch at
The Hague

Office européen
des brevets

Département à
La Haye

PAGE WHITE & FARRER
Attn. Mr Juha-Pekka Ruuskanen
54 Doughty Street
LONDON WC1N 2LS
UNITED KINGDOM

RECEIVED

12 MAY 2000

Ans'd

Aktenzeichen/File No./No. du Dossier

RS 103879 GB

Datum/Date

11. 05. 00

Das Europäische Patentamt übermittelt hiermit den Standardrecherchenbericht zu dem unten bezeichneten Antrag; Kopien der im Recherchenbericht angeführten Schriften werden in der Anlage beigelegt.

The European Patent Office herewith transmits the Standard Search Report relating to the request indicated below; copies of the documents cited in the search report are enclosed.

L'Office Européen des Brevets à l'honneur de vous transmettre ci-joint le Rapport de Recherche concernant la demande désignée ci-dessous; des copies des documents cités sont jointes.

Zeichen und Datum des Antrages Applicant's reference and date Références et date de la demande	92608/PRS/JPR/sir
Dokument, Gegenstand der Recherche Document subject of the search Objet de la recherche	GBA 9921989
Einreichungstag Filing date Date de dépôt	16/09/1999
Beanspruchte Priorität Priority claimed Priorité revendiquée	

OFFICE EUROPÉEN DES BREVETS
Pour le Vice-Président,



DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
Y A	US 5 333 175 A (ARIYAVISITAKUL SIRIKIAT ET AL) 26 July 1994 (1994-07-26) * abstract; figures 4,5 * * column 9, line 30 - column 10, line 22 * * column 13, line 42 - column 14, line 53 * * column 16, line 65 - column 17, line 20 * ---	1-5,13, 15,16, 24-29, 32-34 6-12,14
Y A	WO 99 41850 A (NOKIA TELECOMMUNICATIONS OY ;AALTO RISTO (FI); KOHONEN PEKKA (FI);) 19 August 1999 (1999-08-19) * abstract; figures 1-3,7,8 * * page 3, line 5 - line 19 * * page 6, line 10 - line 26 * * page 8, line 1 - line 14 * * page 13, line 13 - page 16, line 6 * ---	1-5,13, 15,16, 24-29, 32-34 9-12
A	US 5 774 785 A (KARLSSON PATRIK) 30 June 1998 (1998-06-30) * column 2, line 23 - line 55 * * column 5, line 6 - line 19; figure 2A * * column 9, line 37 - column 10, line 19; figures 3,5,7 * --- -/--	1,7, 9-12,15, 16,24, 25, 27-29, 32-34
The present search report has been drawn up for all claims		

CHARGED
DATE

D1

D2

TECHNICAL FIELDS
SEARCHED (Int.CL.7)

H04B

Date of completion of the search

4 May 2000

Examiner

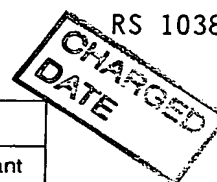
Sieben, S

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document



DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
A	EP 0 936 753 A (NOKIA MOBILE PHONES LTD) 18 August 1999 (1999-08-18) * page 3, line 51 - page 4, line 5 * * page 11, line 55 - page 12, line 18 * * page 13, line 32 - line 36 * * page 14, line 37 - line 46; figures 4,5 *	1,2,7, 9-12,15, 16, 24-29, 32-34	
A	US 5 924 043 A (TAKANO MICHIAKI) 13 July 1999 (1999-07-13) * column 18, line 9 - column 19, line 41; figures 10,25-29 * -----	1,2,6, 9-13,16, 24, 27-29, 32-34	
			TECHNICAL FIELDS SEARCHED (Int.CL.7)
The present search report has been drawn up for all claims			

Date of completion of the search

4 May 2000

Examiner

Sieben, S

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another
document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or
after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding
document

ANNEX TO THE STANDARD SEARCH REPORT NO.

RS 103879

This annex lists the patent family members relating to the patent documents cited in the above-mentioned search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

04-05-2000

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5333175 A	26-07-1994	NONE	
WO 9941850 A	19-08-1999	FI 980348 A	17-08-1999
		FI 981811 A	17-08-1999
		AU 2426899 A	30-08-1999
US 5774785 A	30-06-1998	AU 3280197 A	07-01-1998
		BR 9709832 A	10-08-1999
		CA 2258230 A	24-12-1997
		WO 9749198 A	24-12-1997
EP 0936753 A	18-08-1999	FI 980343 A	14-08-1999
		JP 11284570 A	15-10-1999
US 5924043 A	13-07-1999	JP 10126337 A	15-05-1998

10/088458

PCT

REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

For receiving Office use only	
PCT/EP 00 / 09105	
International Application No.	
14 SEP 2000	(14. 09. 2000)
International Filing Date	
EUROPEAN PATENT OFFICE	
PCT INTERNATIONAL APPLICATION	
Name of receiving Office and "PCT International Application"	
Applicant's or agent's file reference (if desired) (12 characters maximum) 102753/JPR	

Box No. I TITLE OF INVENTION	
POWER CONTROL IN A COMMUNICATION SYSTEM	
Box No. II APPLICANT	
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)	
Nokia Networks Oy Keilalahdentie 4 FIN-02150 ESPOO Finland	<input type="checkbox"/> This person is also inventor. Telephone No. Facsimile No. Teleprinter No.
State (that is, country) of nationality: FI [▲] [Finland] ^{▲▲}	State (that is, country) of residence: FI [▲] [Finland] ^{▲▲}
This person is applicant for the purposes of: <input type="checkbox"/> all designated States <input checked="" type="checkbox"/> all designated States except the United States of America <input type="checkbox"/> the United States of America only <input type="checkbox"/> the States indicated in the Supplemental Box	
Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)	
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)	
LAAKSO, Janne Paraistentie 17 c 44 FIN-00280 Helsinki Finland	This person is: <input type="checkbox"/> applicant only <input checked="" type="checkbox"/> applicant and inventor <input type="checkbox"/> inventor only (If this check-box is marked, do not fill in below.)
State (that is, country) of nationality: FI [▲] [Finland] ^{▲▲}	State (that is, country) of residence: FI [▲] [Finland] ^{▲▲}
This person is applicant for the purposes of: <input type="checkbox"/> all designated States <input type="checkbox"/> all designated States except the United States of America <input checked="" type="checkbox"/> the United States of America only <input type="checkbox"/> the States indicated in the Supplemental Box	
<input checked="" type="checkbox"/> Further applicants and/or (further) inventors are indicated on a continuation sheet.	
Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE	
The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as: <input checked="" type="checkbox"/> agent <input type="checkbox"/> common representative	
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)	
RUUSKANEN, Juha-Pekka PAGE WHITE & FARRER 54 Doughty Street London WC1N 2LS United Kingdom	Telephone No. 020 7831-7929 Facsimile No. 020 7831-8040 Teleprinter No. 8955681
<input type="checkbox"/> Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.	

Sheet No. 2

Continuation of Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)	
<i>If none of the following sub-boxes is used, this sheet should not be included in the request</i>	
<p>Name and address: <i>(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)</i></p> <p>SAHINOJA, Jari Sepelkyyhkyntie 3 B 24 FIN-02660 Espoo Finland</p>	<p>This person is:</p> <p><input type="checkbox"/> applicant only</p> <p><input checked="" type="checkbox"/> applicant and inventor</p> <p><input type="checkbox"/> inventor only <i>(If this check-box is marked, do not fill in below.)</i></p>
State <i>(that is, country)</i> of nationality: Finland	State <i>(that is, country)</i> of residence: Finland
<p>This person is applicant for the purposes of: <input type="checkbox"/> all designated States <input type="checkbox"/> all designated States except the United States of America <input checked="" type="checkbox"/> the United States of America only <input type="checkbox"/> the States indicated in the Supplemental Box</p>	
<p>Name and address: <i>(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)</i></p> <p>HOLMA, Harri Itätuulenkujja 1 B 32 FIN-02100 Espoo Finland</p>	<p>This person is:</p> <p><input type="checkbox"/> applicant only</p> <p><input checked="" type="checkbox"/> applicant and inventor</p> <p><input type="checkbox"/> inventor only <i>(If this check-box is marked, do not fill in below.)</i></p>
State <i>(that is, country)</i> of nationality: Finland	State <i>(that is, country)</i> of residence: Finland
<p>This person is applicant for the purposes of: <input type="checkbox"/> all designated States <input type="checkbox"/> all designated States except the United States of America <input checked="" type="checkbox"/> the United States of America only <input type="checkbox"/> the States indicated in the Supplemental Box</p>	
<p>Name and address: <i>(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)</i></p>	<p>This person is:</p> <p><input type="checkbox"/> applicant only</p> <p><input type="checkbox"/> applicant and inventor</p> <p><input type="checkbox"/> inventor only <i>(If this check-box is marked, do not fill in below.)</i></p>
State <i>(that is, country)</i> of nationality:	State <i>(that is, country)</i> of residence:
<p>This person is applicant for the purposes of: <input type="checkbox"/> all designated States <input type="checkbox"/> all designated States except the United States of America <input type="checkbox"/> the United States of America only <input type="checkbox"/> the States indicated in the Supplemental Box</p>	
<p>Name and address: <i>(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)</i></p>	<p>This person is:</p> <p><input type="checkbox"/> applicant only</p> <p><input type="checkbox"/> applicant and inventor</p> <p><input type="checkbox"/> inventor only <i>(If this check-box is marked, do not fill in below.)</i></p>
State <i>(that is, country)</i> of nationality:	State <i>(that is, country)</i> of residence:
<p>This person is applicant for the purposes of: <input type="checkbox"/> all designated States <input type="checkbox"/> all designated States except the United States of America <input type="checkbox"/> the United States of America only <input type="checkbox"/> the States indicated in the Supplemental Box</p>	
<p><input type="checkbox"/> Further applicants and/or (further) inventors are indicated on another continuation sheet.</p>	

Box No.V DESIGNATION OF STATES

The following designations are hereby made under Rule 4.9(a) (mark the applicable check-boxes; at least one must be marked):

Regional Patent

- ☒ **AP** **ARIPO Patent:** GH Ghana, GM Gambia, KE Kenya, LS Lesotho, MW Malawi, MZ Mozambique, SD Sudan, SL Sierra Leone, SZ Swaziland, TZ United Republic of Tanzania, UG Uganda, ZW Zimbabwe, and any other State which is a Contracting State of the Harare Protocol and of the PCT.
- ☒ **EA** **Eurasian Patent:** AM Armenia, AZ Azerbaijan, BY Belarus, KG Kyrgyzstan, KZ Kazakhstan, MD Republic of Moldova, RU Russian Federation, TJ Tajikistan, TM Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT
- ☒ **EP** **European Patent:** AT Austria, BE Belgium, CH and LI Switzerland and Liechtenstein, CY Cyprus, DE Germany, DK Denmark, ES Spain, FI Finland, FR France, GB United Kingdom, GR Greece, IE Ireland, IT Italy, LU Luxembourg, MC Monaco, NL Netherlands, PT Portugal, SE Sweden, and any other State which is a Contracting State of the European Patent Convention and of the PCT
- ☒ **OA** **OAPI Patent:** BF Burkina Faso, BJ Benin, CF Central African Republic, CG Congo, CI Côte d'Ivoire, CM Cameroon, GA Gabon, GN Guinea, GW Guinea-Bissau, ML Mali, MR Mauritania, NE Niger, SN Senegal, TD Chad, TG Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT (if other kind of protection or treatment desired, specify on dotted line)

National Patent (if other kind of protection or treatment desired, specify on dotted line):

- | | |
|---|---|
| <input checked="" type="checkbox"/> AE United Arab Emirates | <input checked="" type="checkbox"/> LC Saint Lucia |
| <input checked="" type="checkbox"/> AG Antigua and Barbuda | <input checked="" type="checkbox"/> LK Sri Lanka |
| <input checked="" type="checkbox"/> AL Albania | <input checked="" type="checkbox"/> LR Liberia |
| <input checked="" type="checkbox"/> AM Armenia | <input checked="" type="checkbox"/> LS Lesotho |
| <input checked="" type="checkbox"/> AT Austria | <input checked="" type="checkbox"/> LT Lithuania |
| <input checked="" type="checkbox"/> AU Australia | <input checked="" type="checkbox"/> LU Luxembourg |
| <input checked="" type="checkbox"/> AZ Azerbaijan | <input checked="" type="checkbox"/> LV Latvia |
| <input checked="" type="checkbox"/> BA Bosnia and Herzegovina | <input checked="" type="checkbox"/> MA Morocco |
| <input checked="" type="checkbox"/> BB Barbados | <input checked="" type="checkbox"/> MD Republic of Moldova |
| <input checked="" type="checkbox"/> BG Bulgaria | <input checked="" type="checkbox"/> MG Madagascar |
| <input checked="" type="checkbox"/> BR Brazil | <input checked="" type="checkbox"/> MK The former Yugoslav Republic of Macedonia |
| <input checked="" type="checkbox"/> BY Belarus | <input checked="" type="checkbox"/> MN Mongolia |
| <input checked="" type="checkbox"/> BZ Belize | <input checked="" type="checkbox"/> MW Malawi |
| <input checked="" type="checkbox"/> CA Canada | <input checked="" type="checkbox"/> MX Mexico |
| <input checked="" type="checkbox"/> CH and LI Switzerland and Liechtenstein | <input checked="" type="checkbox"/> MZ Mozambique |
| <input checked="" type="checkbox"/> CN China | <input checked="" type="checkbox"/> NO Norway |
| <input checked="" type="checkbox"/> CR Costa Rica | <input checked="" type="checkbox"/> NZ New Zealand |
| <input checked="" type="checkbox"/> CU Cuba | <input checked="" type="checkbox"/> PL Poland |
| <input checked="" type="checkbox"/> CZ Czech Republic | <input checked="" type="checkbox"/> PT Portugal |
| <input checked="" type="checkbox"/> DE Germany | <input checked="" type="checkbox"/> RO Romania |
| <input checked="" type="checkbox"/> DK Denmark | <input checked="" type="checkbox"/> RU Russian Federation |
| <input checked="" type="checkbox"/> DM Dominica | <input checked="" type="checkbox"/> SD Sudan |
| <input checked="" type="checkbox"/> DZ Algeria | <input checked="" type="checkbox"/> SE Sweden |
| <input checked="" type="checkbox"/> EE Estonia | <input checked="" type="checkbox"/> SG Singapore |
| <input checked="" type="checkbox"/> ES Spain | <input checked="" type="checkbox"/> SI Slovenia |
| <input checked="" type="checkbox"/> FI Finland | <input checked="" type="checkbox"/> SK Slovakia |
| <input checked="" type="checkbox"/> GB United Kingdom | <input checked="" type="checkbox"/> SL Sierra Leone |
| <input checked="" type="checkbox"/> GD Grenada | <input checked="" type="checkbox"/> TJ Tajikistan |
| <input checked="" type="checkbox"/> GE Georgia | <input checked="" type="checkbox"/> TM Turkmenistan |
| <input checked="" type="checkbox"/> GH Ghana | <input checked="" type="checkbox"/> TR Turkey |
| <input checked="" type="checkbox"/> GM Gambia | <input checked="" type="checkbox"/> TT Trinidad and Tobago |
| <input checked="" type="checkbox"/> HR Croatia | <input checked="" type="checkbox"/> TZ United Republic of Tanzania |
| <input checked="" type="checkbox"/> HU Hungary | <input checked="" type="checkbox"/> UA Ukraine |
| <input checked="" type="checkbox"/> ID Indonesia | <input checked="" type="checkbox"/> UG Uganda |
| <input checked="" type="checkbox"/> IL Israel | <input checked="" type="checkbox"/> US United States of America |
| <input checked="" type="checkbox"/> IN India | <input checked="" type="checkbox"/> UZ Uzbekistan |
| <input checked="" type="checkbox"/> IS Iceland | <input checked="" type="checkbox"/> VN Viet Nam |
| <input checked="" type="checkbox"/> JP Japan | <input checked="" type="checkbox"/> YU Yugoslavia |
| <input checked="" type="checkbox"/> KE Kenya | <input checked="" type="checkbox"/> ZA South Africa |
| <input checked="" type="checkbox"/> KG Kyrgyzstan | <input checked="" type="checkbox"/> ZW Zimbabwe |
| <input checked="" type="checkbox"/> KP Democratic People's Republic of Korea | |
| <input checked="" type="checkbox"/> KR Republic of Korea | |
| <input checked="" type="checkbox"/> KZ Kazakhstan | |

Check-box reserved for designating States which have become party to the PCT after issuance of this sheet:



Precautionary Designation Statement: In addition to the designations made above, the applicant also makes under Rule 4.9(b) all other designations which would be permitted under the PCT except any designation(s) indicated in the Supplemental Box as being excluded from the scope of this statement. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. (Confirmation (including fees) must reach the receiving Office within the 15-month time limit.)

Supplemental Box

If the Supplemental Box is not used, this sheet should not be included in the request.

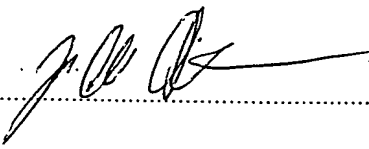
1. *If, in any of the Boxes, the space is insufficient to furnish all the information: in such case, write "Continuation of Box No. ..." [indicate the number of the Box] and furnish the information in the same manner as required according to the captions of the Box in which the space was insufficient, in particular:*
 - (i) *if more than two persons are involved as applicants and/or inventors and no "continuation sheet" is available: in such case, write "Continuation of Box No. III" and indicate for each additional person the same type of information as required in Box No. III. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below;*
 - (ii) *if, in Box No. II or in any of the sub-boxes of Box No. III, the indication "the States indicated in the Supplemental Box" is checked: in such case, write "Continuation of Box No. II" or "Continuation of Box No. III" or "Continuation of Boxes No. II and No. III" (as the case may be), indicate the name of the applicant(s) involved and, next to (each) such name, the State(s) (and/or, where applicable, ARIPO, Eurasian, European or OAPI patent) for the purposes of which the named person is applicant;*
 - (iii) *if, in Box No. II or in any of the sub-boxes of Box No. III, the inventor or the inventor/applicant is not inventor for the purposes of all designated States or for the purposes of the United States of America: in such case, write "Continuation of Box No. II" or "Continuation of Box No. III" or "Continuation of Boxes No. II and No. III" (as the case may be), indicate the name of the inventor(s) and, next to (each) such name, the State(s) (and/or, where applicable, ARIPO, Eurasian, European or OAPI patent) for the purposes of which the named person is inventor;*
 - (iv) *if, in addition to the agent(s) indicated in Box No. IV, there are further agents: in such case, write "Continuation of Box No. IV" and indicate for each further agent the same type of information as required in Box No. IV;*
 - (v) *if, in Box No. V, the name of any State (or OAPI) is accompanied by the indication "patent of addition," or "certificate of addition," or if, in Box No. I, the name of the United States of America is accompanied by an indication "continuation" or "continuation-in-part": in such case, write "Continuation of Box No. I" and the name of each State involved (or OAPI), and after the name of each such State (or OAPI), the number of the parent title or parent application and the date of grant of the parent title or filing of the parent application;*
 - (vi) *if, in Box No. VI, there are more than three earlier applications whose priority is claimed: in such case, write "Continuation of Box No. VI" and indicate for each additional earlier application the same type of information as required in Box No. VI;*
 - (vii) *if, in Box No. VI, the earlier application is an ARIPO application: in such case, write "Continuation of Box No. VI", specify the number of the item corresponding to that earlier application and indicate at least one country party to the Paris Convention for the Protection of Industrial Property or one Member of the World Trade Organization for which that earlier application was filed.*
2. *If, with regard to the precautionary designation statement contained in Box No. I, the applicant wishes to exclude any State(s) from the scope of that statement: in such case, write "Designation(s) excluded from precautionary designation statement" and indicate the name or two-letter code of each State so excluded.*
3. *If the applicant claims, in respect of any designated Office, the benefits of provisions of the national law concerning non-prejudicial disclosures or exceptions to lack of novelty: in such case, write "Statement concerning non-prejudicial disclosures or exceptions to lack of novelty" and furnish that statement below.*

Continuation of Box IV**Agents continues**

PALMER, Roger (GB)
 RICHARDS, David John (GB)
 PENDLEBURY, Anthony (GB)
 JENKINS, Peter David (GB)
 DRIVER, Virginia Rozanne (GB)
 DANIELS, Jeffery Nicholas (GB)
 NEOBARD, William John (GB)
 SHACKLETON, Nicola (GB)
 SLINGSBY, Philip Roy (GB)
 HILL, Christopher Michael (GB)
 WILLIAMS, David John (GB)

All of:

PAGE WHITE & FARRER
 54 Doughty Street
 London WC1N 2LS
 United Kingdom

Box No. VI PRIORITY CLAIM					<input type="checkbox"/> Further priority claims are indicated in the Supplemental Box.
Filing date of earlier application (day/month/year)	Number of earlier application	Where earlier application is:			
		national application: country	regional application: regional Office	international application: receiving Office	
item (1) 16 September 1999 (16. 09. 1999)	9921989.1	GB			
item (2)					
item (3)					
<input type="checkbox"/> The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) (only if the earlier application was filed with the Office which for the purposes of the present international application is the receiving Office) identified above as item(s): <i>* Where the earlier application is an ARIPO application, it is mandatory to indicate in the Supplemental Box at least one country-party to the Paris Convention for the Protection of Industrial Property for which that earlier application was filed (Rule 4.10(b)(ii)). See Supplemental Box.</i>					
Box No. VII INTERNATIONAL SEARCHING AUTHORITY					
Choice of International Searching Authority (ISA) (if two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used): ISA / EP		Request to use results of earlier search; reference to that search (if an earlier search has been carried out by or requested from the International Searching Authority): Date (day/month/year) Number Country (or regional Office) 4 May 2000 RS 103879 EP			
Box No. VIII CHECK LIST; LANGUAGE OF FILING					
This international application contains the following number of sheets: request : 5 description (excluding sequence listing part) : 23 claims : 8 abstract : 1 drawings : 8 sequence listing part of description : Total number of sheets : 45		This international application is accompanied by the item(s) marked below: 1. <input checked="" type="checkbox"/> fee calculation sheet 2. <input type="checkbox"/> separate signed power of attorney 3. <input checked="" type="checkbox"/> copy of general power of attorney, reference number, if any: 4. <input type="checkbox"/> statement explaining lack of signature 5. <input checked="" type="checkbox"/> priority document(s) identified in Box No. VI as item(s): 6. <input type="checkbox"/> translation of international application into (language): 7. <input type="checkbox"/> separate indications concerning deposited microorganism or other biological material 8. <input type="checkbox"/> nucleotide and/or amino acid sequence listing in computer readable form 9. <input type="checkbox"/> other (specify):			
Figure of the drawings which should accompany the abstract: 7		Language of filing of the international application: EN			
Box No. IX SIGNATURE OF APPLICANT OR AGENT					
Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request). RUUSKANEN, Juha-Pekka  (Agent)					

1. Date of actual receipt of the purported international application:		14 SEP 2000 (14. 09. 2000)		2. Drawings:	
3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application:				<input checked="" type="checkbox"/> received:	
4. Date of timely receipt of the required corrections under PCT Article 11(2):				<input type="checkbox"/> not received:	
5. International Searching Authority (if two or more are competent): ISA /		6. <input type="checkbox"/> Transmittal of search copy delayed until search fee is paid.			

Date of receipt of the record copy by the International Bureau:

For International Bureau use only


PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 102753/JPR		FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/EP00/09105	International filing date (day/month/year) 14/09/2000	Priority date (day/month/year) 16/09/1999	
International Patent Classification (IPC) or national classification and IPC H04B7/005			
Applicant NOKIA NETWORKS OY et al.			

- This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
- This REPORT consists of a total of 5 sheets, including this cover sheet.
 - ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).
 - These annexes consist of a total of 2 sheets.
- This report contains indications relating to the following items:
 - I ☒ Basis of the report
 - II ☐ Priority
 - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - IV ☐ Lack of unity of invention
 - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - VI ☒ Certain documents cited
 - VII ☒ Certain defects in the international application
 - VIII ☐ Certain observations on the international application

Date of submission of the demand 10/04/2001	Date of completion of this report 12.12.2001
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer: Burghardt, G Telephone No. +49 89 2399 8979



INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/EP00/09105

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, pages:

1-23 as originally filed

Claims, No.:

1-30 as originally filed

31-36 with telefax of 05/11/2001

Drawings, sheets:

1/8-8/8 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/EP00/09105

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	3,6-27,29-32,34-36
	No:	Claims	1,2,4,5,28,33
Inventive step (IS)	Yes:	Claims	
	No:	Claims	3,6-27,29-32,34-36
Industrial applicability (IA)	Yes:	Claims	1-36
	No:	Claims	

2. Citations and explanations
see separate sheet

VI. Certain documents cited

1. Certain published documents (Rule 70.10)

and / or

2. Non-written disclosures (Rule 70.9)

see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

Re Item V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Reference is made to the following documents:

D1: US-A-5 333 175 (ARIYAVISITAKUL SIRIKIAT ET AL) 26 July 1994 (1994-07-26)

D2: WO 99 41850 A (NOKIA TELECOMMUNICATIONS OY ;AALTO RISTO (FI); KOHONEN PEKKA (FI);) 19 August 1999 (1999-08-19)

2. Novelty (Article 33(2) PCT)

2.1 Document D1, especially the abstract, Figures 4 and 5 and column 16, line 65 to column 16, line 20, discloses a method in a communication system, wherein a controller provides a first station with a target (adjustable RSSI threshold $RSSI_{th}$ based on word error indicator WEI) for a transmission parameter (RSSI) of the radio connection and the first station adjusts the transmission power of a second station on basis of the target, comprising:

monitoring for a predefined condition (RSSI is greater than the predetermined maximum RSSI value);

upon occurrence of the predefined condition (see Figure 4, step 408), preventing use of a target ($RSSI_{th}$) for the transmission parameter exceeding a limit value (maximum RSSI value) for the transmission parameter (RSSI). As can be seen in D1, Figure 4, if $RSSI > RSSI_{max}$, the target ($RSSI_{th}$) is not used, because PC_m is set to 0 in step 410 and then the power control bit PC is also set to 0 at the output of gate 409 irrespective of the result of the comparison step 404 $RSSI < RSSI_{th}$. Hence, the use of the target ($RSSI_{th}$) is prevented.

The term "controller" is very broad and can be any controlling means (hardware and software). Therefore, document D1 discloses all the steps of claim 1 whose subject-matter is consequently not novel.

2.2 The same applies to claim 28 which is the corresponding system claim and claim 33 (the second claim 32 which has to be renumbered) referring to a station which comprises the corresponding features.

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/EP00/09105

- 2.3 Dependent claims 2 to 27, 29 to 32 and 34 to 36 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step.
- In particular, specifying the controller as a radio network controller (cf. claims 27 and 32) controlling power in an outer loop does not involve an inventive step, since such a radio network controller is generally known in radio communication systems, see e.g. document D2.

Re Item VI

Certain documents cited

Certain published documents (Rule 70.10)

Application No Patent No	Publication date (day/month/year)	Filing date (day/month/year)	Priority date (valid claim) (day/month/year)
PCT/US00/02291 WO00/45528	03.08.2000	28.01.2000	28.01.1999

Re Item VII

Certain defects in the international application

1. The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).
2. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the document D1 is not mentioned in the description, nor is this document identified therein.

31. A communication system according to claim 30, wherein the recovery means are arranged to reduce the difference gradually.

5 32. A communication system according to any of claims 28 to 31, wherein the controller comprises a radio network controller of a cellular communication system, the first station comprises a base station of the cellular communication system and the second station comprises a mobile station, and wherein the transmission power to be
10 adjusted comprises transmission power from at least one mobile station towards at least one base station.

33. A station of a communication system, said station
15 controlling transmission power of a further station transmitting towards the station, wherein the station is arranged to:

receive a target for a transmission parameter provided by a controller of the communications system for use in the
20 control of transmission power of the further station;

monitor for a predefined condition; and

upon occurrence of the predefined condition, to prevent use of targets for the transmission parameter exceeding a limit value for the target for the transmission parameter.

25

34. A station according to claim 33, further comprising a first target functionality for receiving the target for the transmission parameter provided by the controller and a further target functionality for generating a further target
30 for the transmission parameter, wherein the arrangement is such that the further target is used for the power control of the further station and corresponds the target received from the controller unless the predefined condition is detected

whereafter the further target is set by the further target functionality such that the limit value for the target is not exceeded.

- 5 35. A station according to claim 34, further comprising detecting means for detecting a difference between the target and the further target and recovery means for reducing the difference after the predefined condition is over.
- 10 36. A station according to claim 35, wherein the recovery means are arranged to reduce the difference gradually.

31. A communication system according to claim 30, wherein the recovery means are arranged to reduce the difference gradually.

5 32. A communication system according to any of claims 28 to 31, wherein the controller comprises a radio network controller of a cellular communication system, the first station comprises a base station of the cellular communication system and the second station comprises a
10 mobile station, and wherein the transmission power to be adjusted comprises transmission power from at least one mobile station towards at least one base station.

32. A station of a communication system, said station
15 controlling transmission power of a further station transmitting towards the station, wherein the station is arranged to:

receive a target for a transmission parameter provided by a controller of the communications system for use in the
20 control of transmission power of the further station;
monitor for a predefined condition; and
upon occurrence of the predefined condition, to prevent use of targets for the transmission parameter exceeding a limit value for the target for the transmission parameter.

25 33. A station according to claim 32, further comprising a first target functionality for receiving the target for the transmission parameter provided by the controller and a further target functionality for generating a further target
30 for the transmission parameter, wherein the arrangement is such that the further target is used for the power control of the further station and corresponds the target received from the controller unless the predefined condition is detected

whereafter the further target is set by the further target functionality such that the limit value for the target is not exceeded.

5 34. A station according to claim 33, further comprising detecting means for detecting a difference between the target and the further target and recovery means for reducing the difference after the predefined condition is over.

10 35. A station according to claim 34, wherein the recovery means are arranged to reduce the difference gradually.